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ABSTRACT

The study examined the use of expository text structure as a reading and writing strategy with 15 learning-disabled adolescents, 15 normally achieving adolescents, and 15 normally achieving fourth graders. Two reading tasks required students to recognize sequence or comparison-contrast text structure. The third task required students to write endings to partially written paragraphs representing sequence or comparison-contrast text structure. It was hypothesized that learning-disabled adolescents would perform similarly to fourth graders, but poorer than their normally achieving peers. All groups demonstrated sensitivity to text inconsistencies during reading, were better able to identify inconsistent sentences embedded in sequence text than in comparison-contrast text, and experienced greater difficulty answering questions for inconsistent than consistent comparison-contrast text. However, learning-disabled adolescents performed less well than their peers and similarly to fourth graders in their use of text structure during writing. The lack of many significant correlations among variables for any group suggests the need for research which systematically investigates strategy use across a variety of texts and tasks. (DB)

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# USE OF EXPOSITORY TEXT STRUCTURE BY ADOLESCENTS WITH LEARNING DISABILITIES

## ABSTRACT OF DISSERTATION

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Education at the University of Kentucky

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By

Sharon Rowe Stewart

Lexington, Kentucky

Director: Dr. A. Edward Blackhurst, Professor of Special Education

Lexington, Kentucky

1986

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ABSTRACT OF DISSERTATION

Sharon Rowe Stewart

The Graduate School

University of Kentucky

1986

ABSTRACT OF DISSERTATION

USE OF EXPOSITORY TEXT STRUCTURE

BY ADOLESCENTS WITH LEARNING DISABILITIES

This research investigated the use of expository text structure as a reading and writing strategy by learning disabled adolescents. It was hypothesized that learning disabled adolescents would perform similarly to younger students, but poorer than their normally achieving peers, in their use of text structure strategy in reading and writing. Further, it was hypothesized that learning disabled adolescents and younger students would show a weaker relationship between text structure use in reading and writing than normally achieving adolescents. Learning disabled adolescents, normally achieving adolescents, and normally achieving fourth graders completed three tasks. In the first task, students read paragraphs representing sequence or comparison-contrast text structure. Half of the paragraphs, presented sentence-by-sentence on the computer, contained a sentence which was inconsistent with the paragraph structure. Text structure use was evaluated by comparing reading time and lookbacks for inconsistent and consistent sentences. Answers to multiple-choice questions served as a comprehension measure. In the second task, students specifically identified inconsistent sentences. The third task required that subjects write two sentences which best completed partially-written paragraphs representing sequence or comparison-contrast text structure.

Text structure use in reading was evaluated by a 3 (group) X 2 (text type) X 2 (consistency) repeated measures analysis of variance for reading time, lookbacks, error detection, and answers to questions. Writing performance was analyzed using a 3 (group) X 2 (text type) repeated measures analysis of variance. Pearson product moment correlations were calculated to assess the relationships between text structure use in reading and writing.

The analyses revealed that learning disabled adolescents used text structure similarly to fourth graders and to their peers in reading; however, as expected, their use of text structure in writing was poorer than that of their peers. Contrary to the prediction, the relationship between text structure use in reading and writing was minimal for all groups. Interpretation of these results and implications for educators and researchers were presented.

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USE OF EXPOSITORY TEXT STRUCTURE

BY ADOLESCENTS WITH LEARNING DISABILITIES

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DISSERTATION

Sharon Rowe Stewart

The Graduate School

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# BY ADOLESCENTS WITH LEARNING DISABILITIES

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DISSERTATION

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## Dedication

This dissertation is dedicated to Dr. Susan M. Belmore. I admired her both professionally and personally, and her courage and strength of character remain an inspiration to me. I wish I could have shared this achievement with her.

TABLE OF CONTENTS


| | | |
|---|---|---|
| ACKNOWLEDGMENTS | | iii |
| CHAPTER 1: | INTRODUCTION AND REVIEW OF THE LITERATURE | 01 |
| | Statement of the Problem | 02 |
| | Review of the Literature | 05 |
| | Students with Learning Disabilities as Inactive Learners | 05 |
| | Text Structure as a Metacognitive Strategy in Reading and Writing | 17 |
| | Use of Text Structure by Students with Learning Disabilities | 39 |
| | Research Hypotheses | 49 |
| | Definition of Terms | 50 |
| CHAPTER 2: | METHODS | 54 |
| | Subjects | 54 |
| | Subject Selection Procedures | 54 |
| | Demographic Data for Groups | 58 |
| | Setting | 61 |
| | Reading Task | 61 |
| | Writing Task | 62 |
| | Instrumentation | 63 |
| | Reading Paragraphs | 63 |
| | Comprehension Questions | 69 |
| | Writing Stimuli | 72 |
| | Computer Program | 74 |
| | Writing Assessment Tool | 79 |
| | Procedures | 80 |
| | Reading Task | 80 |
| | Writing Task | 83 |
| | Procedural Reliability | 84 |
| | Research Design & Analysis of Data | 85 |
| | Reading Task | 86 |
| | Writing Task | 88 |
| | Relationship between Reading and Writing | 88 |
| CHAPTER 3: | RESULTS | 89 |
| | Preliminary Analysis | 89 |
| | General Performance | 89 |
| | Prior Knowledge and Task Performance | 91 |
| | Analysis of Data for Each Hypothesis | 94 |
| | Analysis of Hypothesis 1 | 94 |
| | Analysis of Hypothesis 2 | 116 |
| | Analysis of Hypothesis 3 | 118 |

CHAPTER 4: DISCUSSION 125

Interpretation of Research Results 125
Interpretation of Hypothesis 1 125
Interpretation of Hypothesis 2 132
Interpretation of Hypothesis 3 136
Limitations of the Study 138
Subjects 138
Setting 139
Instrumentation 140
Procedures 143
Design and Analysis 145
Implications for Instruction & Research 148
Implications for Special Education Instruction 148
Implications for Special Education Research 152

APPENDICES 156

A. Informed Consent 157
B. Topic Familiarity Survey 159
C. Text Structure Evaluation 161
D. Sentence Inconsistency Evaluation 162
E. Reading Paragraphs 163
F. Distractor Paragraphs 166
G. Instructions for Evaluation of Questions 167
H. Final Comprehension Questions and Percent Correct Responses 168
I. Instructions for Paragraph Writing 172
J. Writing Stimuli 173
K. Scoring Scale for Writing Task 176
L. Reading Protocol 177
M. Word Lists 179
N. Student Familiarity Rating Scale 181
O. Writing Protocol 182
P. Procedural Reliability Form 183

REFERENCES 185

VITA 195

# CHAPTER I

## INTRODUCTION

As students progress through school, facility in both reading and writing expository text (i.e., text that presents factual, nonfiction information), becomes increasingly important to academic success (Thomas, Englert, & Morsink, 1984). Beginning at about the third grade, children begin to acquire information about the various content areas, such as social studies and science, through independent reading of textbooks (Wiig & Semel, 1984). By the time they reach adolescence, reading from textbooks is a primary means for learning about the various academic areas.

Students also begin using expository text in writing in the primary grades. By third grade, writing tasks may involve composing brief reports related to various social studies or science topics (Baker & Stein, 1981). Report writing and term papers are required with increased frequency in the upper grades, and written responses to examination questions may be used to evaluate competence in various content areas.

Although many children readily acquire proficiency in reading and writing expository text, some students, such as those with learning disabilities, experience great difficulty (Morsink, 1985). Because expository text is used to teach students and to evaluate their progress in the content areas, the academic performance of students who lack competence in reading and writing expository text is almost certain to be adversely affected. Such difficulties may

have far reaching effects on these students' academic progress as requirements for independent textbook reading and expository writing increase during students' adolescent years (Gerber, 1983).

Because of the adverse effects of reading and writing difficulties on the academic success of students with learning disabilities, it is important that more effective programs be developed so that these students can better comprehend and produce expository text. Efforts to develop appropriate programs would be premature without supporting research concerning the influence of various factors on learning disabled students' ability to read and write expository text. One factor which is beginning to receive the attention of special education researchers concerns the difficulty that individuals with learning disabilities may have in using text structure as an organizational strategy for reading and writing expository text.

## Statement of the Problem

The emerging body of research concerning the failure of students with learning disabilities to effectively comprehend and produce expository text suggests that a contributing factor may be the failure of these students to use the organizational patterns of text as a strategy for improving their reading and writing skills (e.g., Englert & Thomas, in press; Nodine, Barenbaum, & Newcomer, 1985). Based on research concerning the characteristics of individuals with learning disabilities, it has been hypothesized that many of these students perform similarly to younger, normally achieving students in

their use of text structure strategy; that is, they function as inactive learners who possess some knowledge of the various structures of text, but fail to actively utilize the structure as an aid to reading and writing text (Bos & Filip, 1984; Wong, 1979; Wong & Wilson, 1984). Further, there is some evidence that individuals with learning disabilities continue to function as inactive learners, even into adulthood (Worden & Nakamura, 1982).

Despite evidence that students with learning disabilities experience difficulty with use of text structure strategy and the knowledge that text structure use may be particularly important to adolescent students as they progress in school, minimal research has been conducted to ascertain the extent of the problem and its precise effects on reading and writing for these students. Such research is necessary in order to develop appropriate assessment tools and instructional programs related to text structure use.

The purpose of this research was to investigate the ability of adolescents with learning disabilities to use expository text structure as a reading and writing strategy. Adolescents were selected as the focus of this study because it is at about the seventh grade that the curriculum makes the transition to almost exclusive use of expository materials. Specifically, the study addressed the following questions: 1) How do adolescents with learning disabilites compare to normally achieving peers and younger students in their use of text structure during reading? 2) How do adolescents with learning disabilities compare to normally achieving

peers and younger students in their use of text structure during writing? and 3) How do adolescents with learning disabilities compare to normally achieving peers and younger students concerning the relationship between use of text structure in reading and writing?

To investigate these questions, 15 adolescent seventh and eighth grade students with learning disabilities completed a series of three tasks designed to assess use of text structure strategy in reading and in writing. Their performance was compared to the performance of two other groups of 15 students - one group of seventh and eighth grade students judged as average readers for their chronological age and another group of fourth grade average readers whose reading comprehension was comparable to that of the adolescents with learning disabilities.

Two reading tasks were administered in the context of the error detection paradigm (Winograd & Johnston, 1982). In the first task, subjects read 12 5-sentence paragraphs representing sequence or comparison-contrast text structure. Half of the paragraphs of each text type, presented sentence by sentence on the computer, contained a sentence in the fourth position which was inconsistent with the text structure of the paragraph. Use of text structure strategy was evaluated by comparing reading time and use of lookbacks for inconsistent and consistent fourth sentences. In addition, a direct measure of reading comprehension was obtained by asking subjects to answer two multiple-choice comprehension questions for each paragraph. In the second reading task, subjects were asked to

identify specific sentences in the paragraphs previously presented which violated paragraph text structure. Sensitivity to text structure was evaluated by the ability to identify inconsistent sentences.

Subjects' use of text structure strategy in writing was also examined. In the third task, subjects wrote two sentences which they though best completed six partially-written paragraphs representing sequence or comparison-contrast text structure. Points were awarded according to how well sentences matched the structure and content signaled in the topic sentence.

## Review of the Literature

The purpose of this section is to provide a review of the pertinent literature related to the research topic. The three major areas of research which will be addressed include: 1) Students with learning disabilities as inactive learners; 2) Text structure as a metacognitive strategy in reading and writing; and 3) Use of text structure strategy by students with learning disabilities.

### Students with Learning Disabilities as Inactive Learners

For children who have been identified as learning disabled, difficulty in reading and writing expository text may be a manifestation of a learning style that differs from that possessed by normally achieving students (Brown & Palincsar, 1982). Torgesen (1977) characterized these students as inactive learners who do not engage in efforts to promote effective learning. This inactivity has been described as a problem in metacognition.

The purpose of this section is to present the theoretical background and related research pertaining to the theory that individuals with learning disabilities are inactive learners. Included in this section are: 1) definition and explanation of metacognition; 2) presentation of Torgesen's (1977) theory concerning individuals with learning disabilities as inactive learners; and 3) review of selected research concerning individuals with learning disabilities as inactive learners.

## Metacognition Defined

The discussion of metacognition and related concepts will begin with clarification of the terms. The first distinction which needs to be made concerns the difference between cognition and metacognition. Whereas cognition refers to the skills and strategies used to learn, metacognition refers to what the learner knows about cognition and the ability to planfully control and monitor these cognitions (Forest-Pressley & Gillies, 1983).

The process of metacognition involves active learning. It entails two related clusters of activities: 1) knowledge about cognition; and 2) regulation of cognition (Baker & Brown, 1984; Brown, 1980). Knowledge of cognition is the understanding learners have concerning their own cognitive resources and the compatibility of learners with the demands of the learning situation. According to Flavell and Wellman (1977), knowledge about cognition encompasses three categories: 1) person variables; 2) task variables; and

3) strategy variables. Person variables include learners' beliefs about their abilities as learners, task variables include learners' understandings about the unique demands of various tasks on learning, and strategy variables concern learners' knowledge of strategies for monitoring learning progress. Knowledge of these variables is required before learners can take steps to meet the demands of the learning task (Baker & Brown; Brown).

The second cluster of metacognitive activities involves regulation of cognition. Regulation of cognition includes the self-regulatory mechanisms employed by active learners in order to solve problems (Baker & Brown, 1984; Brown, 1980). These mechanisms include knowledge of strategies which serve to increase reading comprehension, recognition of obstacles to learning as they occur, and selection and implementation of the most efficient strategy to correct the problem in order to accomplish the task. Regulation of cognition typically is not a conscious process. It proceeds automatically until an obstacle is encountered which disrupts the learning process. At that point, mature learners purposely select and implement one or a combination of several possible activities or strategies in an attempt to correct the problem in the most efficient manner (Brown).

## Learning Disabilities and Inactive Learning

According to Torgesen (1977), efficient learning is an active process in which the learner selects and uses adaptive strategies appropriate to the learning task. The application of these

strategies is an outgrowth of 1) an awareness of both the learner's own cognitive processes and of task demands and 2) a motivation to learn. Motivation, or the intent to learn, leads to a plan of action which, in turn, leads to efficient and purposive learning (Torgesen).

In contrast to his description of the efficient learner as an active participant in the learning process, Torgesen (1977) described individuals with learning disabilities as inactive learners who fail to select and implement appropriate strategies to promote learning. He attributed much of this failure to a lack of goal-directedness or motivation. He stated that the cumulative failures and frustrations related to learning attempts in the past lead to a lack of intent to learn. Consequently, whereas individuals with learning disabilities may possess knowledge of adaptive strategies, they fail to implement them appropriately according to the requirements of the task; that is, the problem may not be one of knowledge of cognition, but one of regulation of cognition. Torgesen defined this failure to apply known strategies as a "performance deficit."

Torgesen (1977) described those with learning disabilities as immature (and perhaps, arrested) in their development as active learners compared to their normally achieving peers. A comparison of Torgesen's description of the learning style of individuals with learning disabilities and that of young learners readily reveals the similarities in the learning style of learning disabled learners and naive learners. A brief summary of the normal course of metacognitive devlopment will clarify Torgesen's view. The normal

development of active learning in naive learners is characterized by metacognitive knowledge of some learning strategies. However, young learners often fail to use these strategies unless prompted or may apply them arbitrarily without considering the goal. As learners mature, they acquire knowledge of more strategies, refine their understanding of already existing strategies, and increase their ability to flexibly apply strategies so that the most efficient and effective strategies are implemented according to the learners' purposes (Baker, 1982; Forrest-Pressley & Gillies, 1983).

Some experts are even more specific regarding the comparison of metacognitive skills in students with learning disabilities to those of normally achieving students. Various researchers have posited that academic skills which require metacognitive operations may be delayed in these students because they lack the metacognitive prerequisites to accomplish them (Baker, 1982). Consequently, learning disabled students and younger, normally achieving children who display similar academic profiles may be expected to possess very similar metacognitive skills.

## Research Concerning Individuals with Learning Disabilities as Inactive Learners

In the last decade, a large body of research has appeared concerning the metacognitive skills of students with learning disabilities. In general, this research provides support for Torgesen's (1977) theory that individuals with learning disabilities

are inactive learners who behave much like younger, normal achievers in their nonstrategic approaches to learning tasks.

It should be noted that research specific to use of text structure strategy is presented in the final section of the literature review. Studies which are applicable to both this section and the final section concerning text structure strategy use by students with learning disabilites will be described here and further clarified in the final section of the literature review when appropriate.

Much of the early research indicates that students with learning disabilities fail to spontaneously apply appropriate strategies in experimental settings. Specifically, students with learning disabilities have been found to be deficient in selective attention strategies (e.g., Tarver, Hallahan, Cohen, & Kauffman, 1977) and in verbal rehearsal strategies (e.g., Newman & Hagen, 1981). Some of the more recent research using school-related activities in applied settings has yielded findings similar to those obtained in experimental settings. For example, Deshler, Ferrell, and Kass (1978) found that students with learning disabilities were less accurate in identifying errors in both externally generated materials (discriminating synonym pairs, identifying misspelled words, editing compositions) and internally generated materials (writing an essay) than their normally achieving peers. In another error monitoring study, Gerber (1982) concluded learning disabled students

consistently overestimated their spelling ability and were unable to predict their likely errors.

Much of the research concerning knowledge and regulation of strategies by students with learning disabilities has involved reading tasks. Wong and Jones (1982) investigated the monitoring skills of learning disabled and normally achieving students in a training study. Adolescents with learning disabilities and normally achieving students received two days of self-questioning training which focused on setting purposes for reading, identifying main ideas, changing identified information into questions, checking questions, and reviewing at the end of the passage. Analysis of pre- and post-test data revealed that learning disabled students' awareness of important ideas, ability to compose quesions, and performance on reading comprehension tasks improved with training. In contrast, performance of normally achieving students was not significantly influenced by training. These findings provided evidence that insufficient monitoring is a cause of poor reading comprehension among students with learning disabilities and that training in monitoring can be effective.

Bos and Filip (1984) investigated comprehension monitoring skills of learning disabled and normally achieving students in an error detection task under standard and cued reading conditions. Learning disabled and average achieving seventh graders read two expository passages, each containing an inconsistency. One passage was read under the standard condition in which subjects read the

essay and then responded to a series of probe questions. The alternate passage was read under the cued condition in which subjects were warned in advance that something did not make sense. Results of probe responses revealed that learning disabled students noted inconsistencies significantly less frequently than average achieving students under the standard condition. However, there was no significant difference between groups under the cued condition; that is, both groups were highly aware of the inconsistencies. The ability of learning disabled students to identify inconsistencies when they were cued was interpreted as evidence that learning disabled students possess the strategies necessary to monitor their reading comprehension, but they fail to implement them unless prompted; i.e., they evidence a production deficiency.

Jenkins, Heliotis, Haynes, and Beck (1986) also investigated the theory that learning disabled students are inactive learners. Subjects completed reading tasks under conditions which required varying degrees of active engagement in the learning process. It was hypothesized that if students with learning disabilities were inactive learners, there would be an interaction between groups and reading condition; that is, whereas normally achieving students would demonstrate little change in performance across treatment conditions, learning disabled students would show greater ability to answer comprehension questions and retell stories under conditions which required greater involvement. Students with learning disabilities and normally achieving students in third through sixth grades read

folktales under three conditions - individually, in the classroom, and using a technique in which they wrote a summarizing sentence after each paragraph. Although normally achieving students consistently performed better on story retelling and question answering tasks, the performance of students in both groups improved under increasingly active conditions and the expected group by reading condition interaction did not materialize. Based on these findings, the authors concluded that both groups of students were relatively inactive learners, but that the learning disabled students were somewhat more so. Further, they stated that the inferior performance of learning disabled students on reading comprehension measures could not be explained entirely by failure to activate learning strategies.

Further support for Torgesen's (1977) conceptualization of learning disabled children as inactive learners was provided in a series of two studies concerning use of self-questioning strategies (Wong, 1982). Results of the first study showed that sixth grade students with learning disabilities failed to spontaneously use a strategy for comprehension of implied information to encode verbal stimuli. In the second study, learning disabled subjects were provided instruction to activate them to generate inferences through use of questions and prompts. The success of this procedure was viewed as evidence that learning disabled students sustained a production deficiency; that is, they possessed the inferencing strategy, but failed to implement it spontaneously.

Wong (1979) conducted a study which showed that students with learning disabilities failed to spontaneously use self-questioning strategies which help readers to identify the important ideas in text. Normally achieving and learning disabled fifth grade subjects read stories and gave recalls under either the Questions or the No-Questions condition. In the Questions condition, subjects produced written recalls after listening to and reading pre-questions and a related story. The procedure for the No-questions condition was the same except that no pre-questions were presented. Analysis of the main idea units from the recalls revealed that groups performed similarly when pre-questions were provided, but learning disabled students recalled significantly fewer main idea units under the No-questions condition. Thus, learning disabled students failed to spontaneously use a self-questioning strategy in order to identify main ideas, but use of pre-questions related to main ideas guided these students to become actively involved in a strategy for remembering important information.

In a subsequent study, Wong (1982) studied strategies for selection of retrieval cues by gifted, average, and learning disabled children. Fifth, sixth, and seventh grade subjects performed recall and cue selection tasks under one of two conditions. In the first condition subjects read and listened to a folktale, produced a written recall, and then performed a cue selection task. For the cue selection task, subjects were provided the story on index cards with each card containing one idea unit. Subjects then were instructed to

select 12 cards which would be most helpful in helping them remember the story. The second condition was identical to the first except that recall was not required prior to cue selection. Results indicated that gifted students utilized more strategic behavior during cue selection than either learning disabled or normal students. Learning disabled students were less likely to check their work and were less exhaustive in their search for appropriate cues than gifted students. However, learning disabled students did use a strategy for locating retrieval cues (albeit, an inefficient one) which consisted of examining carefully each of the idea units.

The ability to adjust study time according to reading task demands was investigated by Wong and Wilson (1984). It was hypothesized that students aware of task demands would require longer study time prior to verbal recall after reading disorganized passages than after reading well organized passages. Normally achieving and learning disabled students in grades 5, 6, and 7 read an organized passage and then studied the passage until they were prepared to give a recall. The same process was followed for the disorganized passage. Results revealed that learning disabled children studied less and recalled less than normally achieving children. These findings were viewed as evidence that learning disabled children did not spontaneously adjust study time to meet the demands of the task.

Support for the theory that learning disabled students fail to implement known study strategies was provided in the second part of the Wong and Wilson (1984) study. Learning disabled students were

trained in a five-step procedure for reorganizing disorganized passages. After training, subjects reorganized a passage, studied it, and then gave a retelling. Results indicated that all children succeeded in regrouping the passages and that recall improved with reorganization. The authors stated that the ease with which subjects learned this task suggests that the procedure may have served only to clarify an already existing awareness passage organization strategy; in other words, learning disabled subjects displayed a production deficiency relative to a strategy for reorganizing passages.

Investigations of metacognitive abilities in reading have been extended to adults with learning disabilities. Worden and Nakamura (1982) investigated the ability of learning disabled and normally achieving adults to extract important information from text following training in a technique for rating importance of idea units. A week after receiving the training, subjects read a story and recalled the passage under one of two conditions. Before-recall subjects were asked to select 12 idea units that would be most helpful in facilitating recall of the story before performing verbal recall, whereas after-recall subjects first gave verbal recall and then selected the 12 idea units. Analysis of the data revealed significantly less agreement on importance ratings during cue selection by learning disabled subjects than by normal subjects. In addition, learning disabled subjects were less likely to select the most important ideas as retrieval cues. However, analysis of the recalls indicated that both groups remembered main ideas better than

details. The investigators concluded that whereas both groups were at least covertly aware of the importance level of idea units in remembering, learning disabled adults were less sensitive to the importance of text information than their normally achieving peers when it was applied to a conscious learning strategy.

Summary

According to Torgesen (1977), individuals with learning disabilities are inactive learners who fail to select and implement appropriate strategies to promote learning. His theory concerning the learning behavior of these students has been verified by subsequent research which indicates that students with learning disabilities are deficient in a variety of metacognitive skills necessary for understanding and remembering what is to be learned. In reading, learning disabled students fail to spontaneously extract main ideas from text or use self-questioning strategies for remembering what they have read. They also fail to monitor their comprehension for errors so that necessary correction strategies can be implemented. Further, the limited research available suggests that these strategy deficits exist in both young children and adolescents and that these deficits persist into adulthood for those with learning disabilities.

Text Structure as a Metacognitive Strategy in Reading and Writing

The previous section of the literature review presented the theory and research pertaining to Torgesen's (1977) theory that individuals with learning disabilities are inactive learners who fail

to use metacognitive strategies. This section of the review concerns the role of text structure as a metacognitive strategy for reading and writing expository text. The first part of this section will discuss the characteristics of text structure. The remaining parts will present the theory and a review of selected research concerning: 1) the role of text structure strategy in reading; 2) the role of text structure strategy in writing; and 3) the relationship between text structure use in reading and writing.

Characteristics of Text Structure

The structure of text can be analyzed at two levels (Kintsch & van Dijk, 1978; Pearson & Camperell, 1981). The first is the microstructure or sentence level which is concerned with the way sentences cohere and are organized within text. The second is the macrostructure or paragraph level which entails the overall organization or gist of the text. It is the macrostructure level which is the focus of this study.

Considerable research has been conducted for the purposes of specifying the macro- or organizational structure of prose. For example, several researchers have developed various models, called story grammars, to explain the organizational structure of narrative stories (e.g., Mandler & Johnson, 1977; Stein & Glenn, 1979). These investigators proposed that stories are organized according to a set of predictable rules which specify the parts of a typical story and their relationship to each other (Mandler & Johnson, 1977). This set of rules is referred to as a story grammar.

Models have also been proposed to describe the structure of discourse which can be applied to both narrative and expository text. According to Kintsch and van Dijk (1978) the structure of text can be represented using a hierarchically arranged list of propositions. A proposition is an idea unit which consists of a relation (verb or adjective) and a set of arguments (nouns and other propositions). Propositions are connnected by means of a repetition rule in which one proposition is referred to by a "superordinate" proposition that contains the "subordinate" proposition as an argument. Propositions may also be connected by sharing the same arguments or concepts. The first proposition that uses the shared argument is considered the superordinate of the proposition that contains the repeated argument.

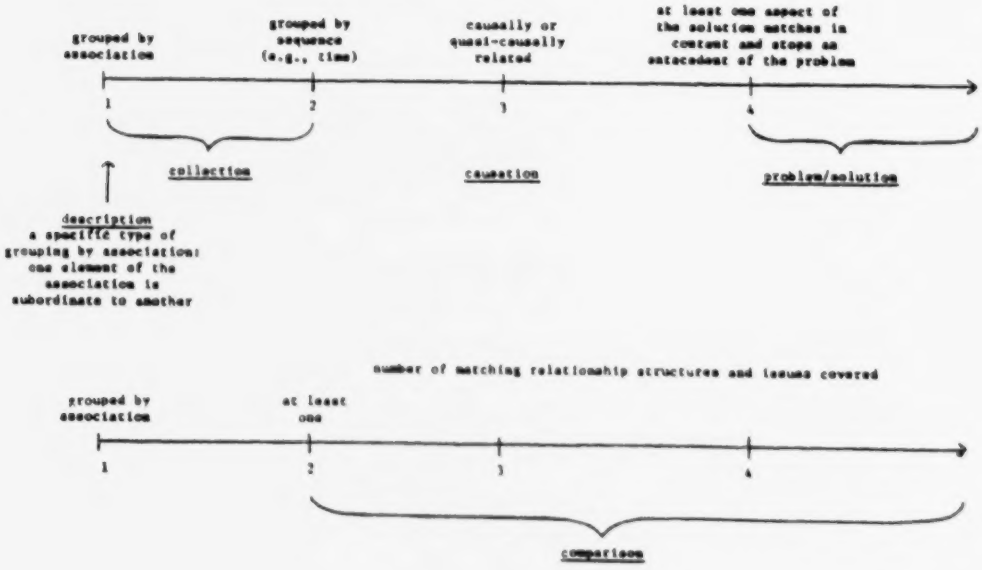
Meyer (1975), like Kintsch and van Dijk (1978), has also proposed a hierarchical representation of discourse. Her theory, which is adapted from Grimes' (1974) semantic grammar of propositions and Fillmore's (1968) case grammar, specifies the logical connections among ideas in text as well as the superordinate-subordinate relationships among ideas, or propositions. Meyer's representation of text structure demonstrates that some ideas from a passage are located at the top levels, others are found at the middle level, and still other ideas are found at the bottom levels of the structure. Most of the ideas located at the top levels of the content structure have several levels of ideas beneath them and related to them in a downward path in the structure. These top level ideas dominate their

subordinate ideas, while the lower level ideas describe or give more information about the ideas above them in the structure.

Although Meyer's (Meyer, 1975; Meyer & Freedle, 1984) representation of the organization of text shares some similiarites to Kintsch and van Dijk's (1978) theory, Meyer's theory goes further in describing the structure of text by identifying and classifying different types organizational patterns in expository text. The five basic text structures in her classification scheme - description, collection (including sequence), causation, problem/solution, and comparison - are presented in Figure 1 (Meyer, & Freedle, 1984, p. 123).

Figure 1

Type and Number of Specified Organizational Components Required for the Different Discourse Types



The scale at the top of Figure 1 depicts four of the text structures on a continuum from least to most organized. Degree of organization is determined according to the type and number of specified organizational components required for each text structure. Unlike the other structures, comparison structure is not organized on the basis of time or causality, but on the basis of similarities and differences; consequently it is displayed on a separate scale at the bottom of Figure 1 (Meyer & Freedle, 1984).

An examination of the scale shown at the top of Figure 1 shows that collection is a somewhat flexible text structure in which lists of elements are associated in some manner. Description is the least organized, simplest form of collection structure. It involves a single organizational component which entails only the subordination of ideas to a superordinate concept. Sequence text organization, which is a more complex form of collection text structure, is comprised of two organizational components - elements grouped by association and by time of occurrence. Causation structure is considered to be more complex in its organization than collection because of the addition of causal relationships among elements. The most organized structure on the first scale is the problem/solution scheme. This structure possesses all the organizational components of causation with the additon of overlapping content between propositions in the problem and solution and at least one element of the solution able to block an antecedent of the problem. An examination of the bottom scale shows that complexity of the

comparison structure is quite variable and increases as the number of matching relationships compared increases (Meyer, & Freedle, 1984, pp. 122-124).

Use of Text Structure Strategy in Reading

Most reading experts concur that reading is the process of constructing meaning from print (Anderson, Hiebert, Scott, & Wilkinson, 1985). This process requires that readers draw on their knowledge of the topic and use this knowledge to fill in missing information and integrate content presented in the text. Thus, it can be said that readers "construct" meaning.

Effective reading is strategic (Anderson et al., 1985). It is an ongoing process which involves the selection and implementation of metacognitive strategies according to the reader's purpose for reading, familiarity with the topic, and complexity of the text. During reading, the reader monitors whether comprehension is occurring and ensures that the comprehension process continues smoothly by taking corrective action when comprehension falters. Some types of corrective action which may be implemented when comprehension is disrupted include: 1) ignore the obstacle and read on; 2) suspend judgement and skim ahead for clues; 3) go to an outside source; 4) reread the confusing information; and 5) adjust reading rate (Baker, 1979).

One of the many metacognitive strategies necessary for monitoring and understanding text is text structure strategy. Text structure strategy in reading involves using the structure of text as

an organizational framework for remembering and understanding what is read. The use of this strategy first requires that the reader has knowledge of various text structures. When the reader encounters text, he or she then selects from memory the structure that best matches the text. The structure then assists the reader because it specifies the logical connections in text, provides an organizational pattern to help the reader predict missing and confusing information, and helps the reader tie together the ideas presented in text (Meyer, Brandt, & Bluth, 1980).

According to Meyer and Freedle (1984), comprehension of mature readers is aided more by complex structures encompassing a greater number of organizational components than by simple structures involving fewer components, probably because these components provide clues for organizing and remembering what is read. Consequently, texts organized according to comparison, problem/solution, or causation structures are more easily remembered than those organized according to description or collection (including sequence) structures. However, Meyer and Freedle do not speculate on the developing awareness and use of these structures by young or poor readers.

Research on text structure strategy use in reading. This section presents a selected review of the literature pertaining to the use of text structure as a metacognitive strategy in reading. Subjects in these studies (and the ones which follow concerning writing) typically include students enrolled in regular education

settings or normal adults. A review of the literature concerning use of text structure by subjects with learning disabilities will be provided in the next section.

A large body of research exists which attests to the importance of story structure knowledge on recall and comprehension of narrative text (e.g., Mandler & Johnson, 1977; Stein & Nezworski, 1978; Thorndyke, 1977). However, this review is concerned with the overall organizational structure of expository text and its use as a strategy for improving reading and writing skills. Some of the research using more general classification systems which can be applied to expository text, such as superordinate (main idea) and subordinate (related detail) relationships, is cited because most research on expository text structure has used this classification.

A synthesis of research concerning use of expository text structure as a strategy in reading reveals two major trends. These trends are: 1) Use of expository text structure strategy improves with age and ability; and 2) Use of expository text structure strategy is differentially affected by the various types of text structures. The following is a discussion of these trends.

Research shows that text structure strategy is acquired developmentally and improves as reading ability improves (e.g., Brown & Smiley, 1977; Danner, 1976; Englert & Hiebert, 1984; Englert, Stewart, & Hiebert, 1984; McGee, 1982; Taylor, 1980). For example, Danner found that children in second, fourth, and sixth grades could identify main ideas; however, only those in the upper two

grades could organize sentences according to topical groupings. Of these two grade levels, only sixth graders could describe their strategy for using text structure to form the groupings. In addition, older children were more skilled than younger children in detecting differences in organization between the organized and disorganized passages and in understanding the usefulness of topical organization for recall.

Further evidence that text structure strategy is developmentally acquired was provided in a study by Brown and Smiley (1977). Subjects at ages 8, 10, 12, and 18 years rated the importance of idea units to the structure of a passage. Results indicated that only subjects in the two older groups were able to agree on the importance ratings. However, subjects in all groups showed awareness of structural importance during recall; that is, the most important units were typically recalled and least important units were rarely recalled. The failure of the younger children to identify the important elements of text even when they showed evidence of sensitivity to structure during recall was interpreted as evidence of immature metacognitive development.

Taylor and Samuels (1983) investigated the effects of text structure on recalls of readers who were judged as aware or unaware of text structure. Fifth and sixth grade subjects read two passages - one organized and one disorganized - and then provided recalls. Performance on recalls revealed that students who were aware of text structure recalled more of the organized passages than students who

were unaware. Students who were aware of text structure also provided better recalls for organized than disorganized passages, but those who unaware of text structure showed no differences in their recalls across passages. These findings supported the theory that use of text structure as a strategy for remembering is effective in improving reading comprehension. However, the authors also noted that most students in the study failed to use the structure of text to aid their reading comprehension.

In a subsequent study, Taylor (1985) found that text structure improved with age. This study examined the differential ability of sixth graders and undergraduate college students to write summaries of social studies material. Subjects read passages and then provided either oral summaries or probed and written free recalls. Unlike the college students, sixth graders did not uniformly follow the structure of passages in their recalls. However, sixth graders' ability to follow text structure increased under probed recall conditions. These findings indicated a developmental trend in sensitivity to authors' text structure.

Some recent studies have investigated developing awareness of specific text types. For example, Taylor (1980) investigated the relationship of reading ability and age to recall and sensitivity to attribution (description) text structure. Sixth grade good and poor readers and fourth grade good readers read and recalled passages representing attribution text structure. Results indicated that readers who followed the author's text structure in their delayed

written recalls were able to remember more than those who failed to follow the text structure. In addition, it was found that use of the author's text structure in organizing recalls increased with age, although even sixth grade good readers lacked facility in the use of text structure organization.

Like Taylor (1980), Meyer et al. (1980) used performance on immediate and delayed recalls as measures of text structure use. Good, average, and poor comprehenders in the ninth grade read expository passages and then provided written recalls. A written recall was also provided a week later. Similar to Taylor's observation, Meyer et al. found that even good comprehenders often failed to follow the author's text organization in recalls. However, results showed a strong relationship between comprehension skills and use of text structure; that is, good comprehenders were more likely to use text structure in their recalls than poor comprehenders.

McGee (1982) analyzed recalls of description text provided by third and fifth grade subjects of different reading abilities for evidence of text structure awareness. Results revealed that fifth grade good readers provided more superordinate than subordinate idea units in their recalls than either fifth-grade poor readers or third-grade good readers.

In a study by Englert and Hiebert (1984), third and sixth graders, divided into high, medium and low ability groups, were given topical information from sequence, comparison-contrast, description, and enumeration text structures. Subjects then completed a task in

which they rated how well target and distractor statements belonged with the original stimulus sentences. Results indicated that sixth graders performed better than third graders at discriminating consistent from inconsistent information and high ability third and sixth grade readers were better able to identify target and distractor sentences than low ability readers for all four types of text structures.

An error detection task was used to assess text structure awareness in a study by Englert et al. (1984). In this study, third and sixth grade subjects divided into three ability groups were asked to identify and correct three types of inconsistencies (reader based, text based, and text-structure based), embedded in short paragraphs representing comparison-contrast, sequence, and enumeration text structures. Results revealed that text structure errors were more difficult to identify than errors related to world knowledge or information stated in the text and that ability to identify text structure inconsistencies improved with age.

Although text structure knowledge is superior for mature readers compared to young readers, research indicates that even many adult readers lack awareness of the structure of text. In a study of awareness of superordinate and subordinate relationships, Baker (1979) asked college students to identify inconsistencies located in either main ideas or details of expository prose. The finding that confusions were recognized more readily in main point than in detail information indicated that these students discriminated the

superordinate-subordinate relationships in text; that is, they monitored main ideas more than detail information. However, the fact that only 38% of all errors were identified led to a subsequent study in which methods were modified.

Baker and Anderson (1982) noted that a limitation of the previous study (Baker, 1979) involved the use of data obtained after reading (probed recall) to make inferences about events occurring during the process of reading. Consequently, a study was designed in which on-line measures of comprehension monitoring were obtained. College students were able to control the exposure time per sentence and the sequence of sentence presentation as they read paragraphs containing inconsistencies presented sentence-by-sentence on a computer. It was expected that subjects would spend more time reading sentences in which they detected inconsistencies in an effort to resolve the discrepancy. It was also expected that subjects would employ lookbacks when an inconsistency was detected in an effort to resolve or verify the difficulty. Results revealed that college subjects spent more time reading sentences containing main idea than detail inconsistencies, but there were no significant differences between use of lookbacks for main idea and detail inconsistencies. When subjects specifically were asked to locate inconsistent sentences, main ideas and detail inconsistencies were identified with almost equal accuracy. These results did not indicate strong differentiation of main idea and detail information.

Hiebert, Englert, & Brennan (1983) concluded that use of various text structures in adults was related to reading ability. Using the task for discriminating target and distractor statements described in the Englert and Hiebert (1984) study, Hiebert et al. found that high-ability college students were better able to identify target and distractor sentences for enumeration and comparison-contrast text structures than low-ability students.

Berkowitz and Taylor (1981) conducted one of the few studies which failed to show that text structure awareness was related to ability differences. Competent and less competent sixth grade readers provided written recalls after reading text which varied according to text type and familiarity. Failure to obtain main effects for group on the quality of recalls was interpreted as evidence that good and poor readers perform similarly on simple material.

Slater, Graves, and Piche (1985) examined written recalls and responses to comprehension questions to determine the influence of structure, coherence, unity, and elaboration on the comprehension of good and poor fifth grade readers. Results revealed that recalls and responses to questions were better for good readers under all conditions, although revisions improved the performance of both groups equally. These results suggested that both good and poor readers use text structure strategy and that the performance of poor readers cannot be attributed to lack of text structure use.

The second trend relative to text structure use during reading is that use of expository text structure strategy is differentially affected by the type of text structure. Bridge and Tierney (1981) conducted studies concerning the differential effects of narrative and expository text on text structure awareness and use. Third grade good and poor readers read an expository passage and a narrative passage and then provided free recalls and responses to probes. Results revealed a similar pattern of poor use of expository text structure for both groups; however, good readers were better able to use narrative text structure than poor readers. These findings indicated that development of expository text structure use lagged behind that of narrative text structure.

Elliott (1980) investigated knowledge and use of adversative (comparison/contrast) and attribution (description) text structures by sixth grade normal readers. Students read a passage representing one of the text structures and then produced written recalls. Analysis of the structure of the recalls revealed that although attribution text structure was most salient, it was used by only 53% of the subjects, and the adversative text structure was used by 38% of the subjects. These results indicated that many sixth grade students lacked use of text structure strategy for either text structure used in this study.

Research by Meyer et al. (1980) also revealed that text structure differentially affects use of text structure strategy. Ninth grade students read comparison and problem/solution structure

passages in with-signaling or without-signaling conditions. (According to Meyer et al., signaling is the information in text which does not add new content, but which emphasizes or points out semantic content or aspects of its structure.) Students produced written recalls immediatly after reading the passages and again after a one week interval. An analysis of the differential effect of text structure revealed that text structure strategy was employed more frequently for the problem/solution passage than for the comparison passage, although only 50% of the students used the author's text organization in any of their recalls.

The series of studies by Englert, Hiebert, and their colleagues (Englert & Hiebert, 1984; Englert et al., 1984; Hiebert et al., 1983) previously reported also provided support for the differential effects of text structure on reading. The study by Englert and Hiebert revealed description and comparison-contrast text structures to be less salient than sequence and enumeration text structures for both third and sixth graders. However, results of a subsequent study by Englert et al. yielded no main effects due to text type, although analysis of text by group effects indicated that sixth graders were better than third graders at detecting inconsistences for enumeration and comparison-contrast than for sequence and description passages. In a study of adult college students, Hiebert et al. again found no significant effects for text. However, the superior performance by high ability students compared to low ability students for comparison-contrast and enumeration text structures was interpreted

as evidence that comparison-contrast text structure is difficult and is only mastered by skilled readers.

Slater et al. (1985) conducted an intervention study which failed to show effects due to text structure differences on use of text structure strategy. Ninth grade students of high, medium, and low reading ability were provided prior information about the organization of four types of expository passages (adversative, attribution, covariance, and response) in one of four treatment conditions. Results of the study showed similar effects for treatment conditions across all organizational patterns. These results led the authors to conclude that difference in passage organization was not a powerful variable in the study.

Use of Text Structure Strategy in Writing

The complex task of writing involves three nonlinear, recursive stages: planning, translating, and reviewing (Hayes & Flower, 1980). During the planning stage, writers contend with the "higher level skills" of developing ideas, gathering information, and structuring or organizing content (Applebee, 1981). As authors plan their compositions they must consider their purpose for writing and the intended audience. The translating stage requires that writers develop their topic on paper. In this phase, authors must attend to "lower level" tasks, such as spelling, punctuation, and grammar while keeping in mind the overall framework of the composition. During the review stage, writers polish their work by revising and editing. Such tasks as checking punctuation and spelling, modifying word

selection and sentence structure, and clarifying and reorganizing content occur at this level. During the dynamic process of writing the author moves back and forth between these three stages in a complex intermixing of these steps (Hayes and Flower).

Similar to reading, skillful writing is an ongoing process which entails use of a variety of metacognitive skills. One metacognitive strategy that assists writers in the important task of selecting and organizing content congruent with an overall plan is text structure strategy. As in reading, the use of this strategy requires that the writer be knowledgeable of various text structures. During the planning stage, the writer selects the appropriate structure depending on the purpose for writing and the intended audience. The selected structure serves the writer by providing a framework for gathering, generating, and subsuming textual details which are relevant to the overall conceptual plan (Brown, 1981; Taylor & Beach, 1984).

Research on text structure strategy use in writing. Similar to the trends reported in reading research, the emerging body of research in writing indicates that use of text structure strategy increases with age and ability and text structure use is differentially affected by the types of text structure. In one of the few studies concerning the use of text structure strategy in writing, Englert et al. (1985) asked third and sixth grade students of high, medium, and low reading ability to complete two writing tasks - one in which they generated an appropriate topic sentence

when provided related detail sentences and another in which they generated two detail sentences when given a topic sentence and a related detail sentence. Analysis of students' writing protocols revealed that high ability students were better able to generate both topic sentences and related detail sentences which conformed to the prevailing text structure than low ability students, and sixth graders were better able to generate both main idea and related detail sentences than third graders. However, both groups performed poorly on these tasks.

Hiebert et al. (1983) assessed use of text structure by mature writers by asking college students to generate two sentences consistent with a main idea sentence or with a stem containing a main idea sentence followed by an appropriate related detail sentence. High-ability students performed at 77% accuracy and low-ability students achieved 62% accuracy in generating related detail sentences. These findings indicated that even mature individuals were not adept at using text structure as an organizational framework during writing.

Two studies which indicate that text structure strategy use in writing is differentially influenced by type of text structure have been conducted by Englert et al. (1984) and Hiebert et al. (1983). In an examination of the writing protocols provided by third and sixth grade students on a paragraph completion task, Englert et al. found that the enumeration text structure was easier for students to use than sequence or comparison-contrast text structures. Analysis

of the writing protocols of adult writers by Hiebert et al. indicated that even adult writers are influenced by text type. The analysis revealed that completing paragraphs conforming to comparison-contrast text structure was significantly more difficult than completing description, enumeration, or sequence paragraphs for these subjects.

Relationship Between Text Structure Use in Reading and Writing

Since reading and writing are both constructive processes involving a similar language base, it is assumed that relationships exist between them (Anderson et al., 1985). In a review of the literature concerning reading and writing relationships, Stotsky (1983) found this assumption to be verified by intervention studies which show that teaching reading improves writing skills and vice versa. In addition, numerous correlational studies have been conducted which reveal significant relationships between reading and writing which increase with ability (e.g., Loban, 1966).

The nature of the relationships between specific skills or strategies used in reading and writing, such as use of text structure, is uncertain. As previously stated, text structure use in reading assists readers in organizing text and identifying relationships between propositions. Text structure use also serves an organizational function in writing by providing a framework for developing ideas, collecting pertinent information, and generating text. Since use of text structure appears to fulfill similar functions in comprehension and production of text, it could be hypothesized that text structure use in reading and writing are

related. In fact, a preliminary investigation of the correlational relationships between specific components of reading and writing suggests that, not only is there a relationship between text organization in reading and writing, but the relationship increases with ability (Shanahan, 1984).

Research on the relationship between use of text structure strategy in reading and writing. Because of the lack of research concerning this topic, studies using either narrative or expository text were examined. In a study of narrative text, Braun and Gordon (1984) examined the effects of story grammar instruction in writing on both reading and writing skills. Fifth grade subjects were trained in the components of story grammar and then taught a procedure for writing stories using the grammar. Post-treatment assessment revealed no significant differences in the performance of the treatment and control groups for the use of narrative text structure for either reading recall or writing. However, the treatment group showed significant improvement on a standardized reading test compared to the control group.

The only study which examined the relationship between expository text structure use in reading and writing was a correlational study conducted by Hiebert et al. (1983). Correlations between third and sixth graders' performance on detection of distractor and target sentences during reading and the ability to write detail sentences were significant, but moderate ($r = .35$). Of the four text structures assessed, correlations between the reading

and writing measures proved to be significant for sequence, comparison-contrast, and enumeration text structures, but not for description text. Neither of these studies dealt with the developing nature of text structure relationships in reading and writing.

Summary

Meyer (1975) and Meyer & Freedle (1984) have identified five organizational patterns or expository text structures which are differentiated according to the type and number of specified organizational components required for the text structure. These text structures are used in reading as organizational frameworks for remembering and understanding what is read. In writing, text structure provides a framework for developing ideas, collecting pertinent information, and generating text consistent with an overall plan.

The research concerning use of expository text structure as a reading strategy has revealed two trends. The first trend is that use of text structure strategy in reading increases with age and ability. The second trend is that text structure use is affected by the organizational structure of text. However, studies differ in their findings concerning the relative influence of the text types. Although less research has been conducted concerning text structure use in writing than in reading, research to date indicates that these two trends also apply to text structure use in writing. In addition, the few studies concerning reading and writing relationships indicates a moderate relationship between text structure use in

reading and writing, and one correlational study indicates suggests that this relationship may increase with ability.

## Use of Text Structure Strategy by Students with Learning Disabilities

The previous two sections of the literature review pertained to the generalized failure of individuals with learning disabilities to actively use strategies to aid in learning and to the importance of text structure as a strategy for reading and writing expository text. A logical extension of these findings is that the reading and writing difficulties of students with learning disabilities are due, in part, to failure to use text structure strategy as an aid to improving reading and writing skills. However, few studies have investigated the use of text structure by students with learning disabilities as an aid to reading and writing. Similar to research involving regular education students, most research concerning text structure use by individuals with learning disabilities has dealt with the relationship between main idea and detail rather than overall organizational structure of text. Further, the majority of the research concerns narrative, rather than expository, text. Because of the lack of research concerning expository text structure, some research concerning the structure of narrative text will be included in this section of the review.

This section presents a review of the available research specific to individuals with learning disabilities pertaining to: 1) use of text structure strategy in reading; 2) use of text

structure in writing; and 3) relationship between text structure use in reading and writing.

Use of Text Structure in Reading by Students with Learning Disabilities

Similar to the research concerning normally achieving students, most research involving students with learning disabilities indicates that these students use text structure in reading less well than their peers of higher reading ability. One of the first studies concerning the ability of students with learning disablities to discriminate main idea and detail information and the influence of this ability on reading comprehension was conducted by Hansen (1978). Regular education and learning disabled fifth and sixth grade students were instructed to read a story of either third- or fifth-grade readability for the purpose of retelling the story and answering comprehension questions. Results of the propositional analyses performed on recalls revealed that story recalls of learning disabled children contained fewer main ideas than those of average readers, although the groups did not differ in the number of supporting details recalled. In addition, average readers performed significantly better than learning disabled readers in answering fifth grade comprehension questions. Based on these findings, the investigator concluded that learning disabled readers are less able to recall stories and answer comprehension questions and have greater difficulty in discriminating main ideas and supporting details than their average peers.

The study described earlier in the literature review by Jenkins et al. (1986) provides support for Hansen's findings. Results of this study showed that the story recalls of third and sixth grade learning disabled students contained less of the important (main idea) information than those of the regular achieving students. These findings were viewed as evidence that less skilled learning disabled students are less sensitive to the importance levels of information in text than are regular education students.

A series of studies summarized earlier in the literature review by Wong (Wong, 1979; Wong, 1982; Wong & Wilson, 1984) indicates that students with learning disabilities may have knowledge of text structure but may fail to use this knowledge as a strategy for understanding text. The conclusion by Wong and Wilson that upper-elementary age students with learning disabilities have greater difficulty discriminating between organized and disorganized text than their higher achieving peers was upheld in a later study by Englert and Thomas (in press).

Contrary to research which indicates that learning disabled students are lacking in their use of text structure strategy compared to their higher achieving peers, Worden and his colleagues (Worden & Nakamura, 1982; Worden, Malmgren, & Gabourie, 1982) found that use of narrative text structure did not improve with recall ability. In the study by Worden et al., learning disabled adults were compared to normal adults attending a community college, normal adults attending a university, normal third graders, and normal sixth graders.

Subjects listened to four narrative stories and then produced delayed oral recalls. Results revealed that the structure of recalls was similar for all groups although learning disabled and third grade subjects recalled less information than the other two groups; that is, all groups performed similarly in their mention of story structure components. These findings indicated that the failure of learning disabled subjects to recall as much information as more mature readers could not be explained by a deficiency in knowledge of story structure. However, results of a training study by Worden and Nakamura suggested that learning disabled adults may be as sensitive to text structure as normal adults, but they may have difficulty applying it.

In the single study which investigated the development of text structure skills in students with learning disabilities, Englert and Thomas (in press) found that text structure use by these students does not improve with age. Third grade and sixth grade students with learning disabilities rated how well target and distractor sentences belonged with sets of original stimulus sentences. Results revealed that students with learning disabilities not only had greater difficulty determining the fit of sentences than did normally achieving students, but the performance of students with learning disabilities failed to improve with age.

The findings of the single investigation concerning the influence of text type on text structure use is consistent with research using normally achieving students. The study by Englert and

Thomas (in press) which was previously described revealed that sentences inconsistent with the structure of the paragraph were easier to identify for sequence text than for enumeration or description text structure. In addition, ability to detect inconsistent sentences was more difficult for comparison-contrast text structure than for any of the other text types. These findings indicated that sequence text was the most salient and comparison-contrast text was least salient text type for these students.

Use of Text structure in Writing by Individuals with Learning Disabilities

Several studies concerning text structure use in writing by students with learning disabilities suggest that their use of text structure is less skilled than that of their normally achieving peers; however, no studies have investigated the development of these skills for learning disabled students. Englert and Thomas (in press) asked third and sixth grade learning disabled and normally achieving students to write two sentences which would best complete paragraphs in which a topic sentence indicating the topic and structure of the paragraphs and a supporting detail were provided. An analysis of writing protocols revealed that learning disabled students and younger normally achieving students performed similarly and had greater difficulty with the task than did normally achieving older students.

Nodine et al. (1985) found that learning disabled students had difficulty using story structure as an organizational strategy during writing. Eleven year old students with learning disabilities, reading disabilities, and normally achieving students participated in the study. Subjects viewed three sequence pictures and then wrote a story about them. Analysis of writing protocols indicated that students with learning disabilites produced significantly fewer stories which conformed to a simple story grammar (setting, conflict, and resolution) than either of the other two groups. In fact, nearly half of the products produced by students with learning disabilities were described as simple picture description or idiosyncratic responses. Based on their findings, the authors concluded that both learning disabled and reading disabled students lacked knowledge of story structure.

Gregg (1983, 1986) reported on research which examined the writing characteristics of adult learning disabled college students. His research indicated that difficulties in the use of transitional ties (or what Meyer (1975) calls signaling devices) persists into adulthood. Examination of the writing of college students revealed that students with learning disabilities use fewer ties than both normal and basic writers (those with poor writing ability). The author noted that learning disabled students typically used the words "and" and "but" to indicate relationships among ideas rather than more complex ties, such as "therefore, instead," or "similar" - a characteristic which describes much younger writers. According to

Meyer (1975), these ties are important in conveying the relationships among the elements of various text structures.

Results of studies concerning the differential effects of text type on writing are equivocal. Blair and Crump (1984) investigated the differential effects of text structure on the syntactic complexity of the writings of learning disabled students. Learning disabled subjects in grades 6, 8, and 10 viewed a film concerning the day in a life of a boy and then wrote an essay using either a descriptive or argument text structure. After several weeks, students again viewed the film and wrote using the alternate text structure. Results revealed that syntactic complexity was greater for the argument text structure than for the descriptive text structure and that this difference increased at the higher grade levels. These findings indicated that discrimination of text structures is a developing skill and that argument text structure requires greater mastery of syntax than descriptive text structure.

Englert and Thomas (in press) examined the differential use of four types of expository text structure in writing by learning disabled students. Analysis of the writing protocols for the paragraph completion task previously described revealed no significant differences according to text type.

Relationship between Text Structure Use in Reading and Writing

The only study pertaining to the relationship of text structure use in reading and writing for students with learning disabilities was conducted by Englert and Thomas (in press). Correlations

performed for the ability to rate target and distractor statements in reading and paragraph completion in writing indicated moderate, but significant, relationships between the reading and writing scores for all groups. Although correlations were not performed for individual groups, a comparison of scores on the reading and writing tasks revealed that the gap between percent correct on the two tasks narrowed as ability increased. This finding suggests that the relationship between use of text structure in reading and writing increases with ability.

## Summary

Research generally supports Torgesen's (1977) theory that individuals with learning disabilities are lacking in their use of metacognitive strategies and that this difficulty persists into adulthood. Research also indicates that text structure is an important metacognitive strategy used in reading and writing. Although many experts characterize individuals with learning disabilities as failing to use metacognitive strategies and it is well established that these individuals have poor reading and writing skills, research is limited concerning the use of expository text structure strategy in reading and writing by these students.

Studies regarding use of text structure in reading generally indicate that students with learning disabilities fail to use text structure as a reading strategy as effectively as their normally achieving peers (e.g., Englert & Thomas, in press; Hansen, 1978; Jenkins et al., 1986; Wong, 1984). However, Worden et al. (1982)

found that the poorer recall of learning disabled adults compared to more skilled readers could not be attributed to lack of sensitivity to story structure. The single study which investigated the development of text structure skills in students with learning disabilities revealed that, unlike normally achieving readers, these skills did not improve with age (Englert & Thomas, in press). In the same study, Englert & Thomas provided the only research available concerning the differential effects of text type on text structure use by learning disabled students. Results of their study revealed that these students were more sensitive to sequence text structure than to enumeration or descriptive text structures. They were least sensitive to comparison-contrast text structure.

Even less research has been conducted relative to text structure use in writing by individuals with learning disabilities. As expected, research comparing learning disabled students to their normally achieving peers indicates that these students are poorer in their use of text structure in writing both narrative (Nodine et al., 1985) and expository (Englert & Thomas, in press) text than their peers. Although no studies have been conducted regarding the developmental nature of text structure use in writing, Gregg (1983, 1986) found that the use of transitional ties which signal the structure of text is lacking in the writing of adult learning disabled writers. Of the two studies which investigated the differential effects of text structure on writing by students with learning disabilities, one found no effects due to type of text

structure for elementary school students (Englert & Thomas, in press) and the other found descriptive text structure to be more salient than argument text structure for adolescent writers (Blair & Crump, 1984).

The single study concerning the relationship between text structure use in reading and writing indicated a moderate, but significant relationship. Further, analysis of the scores suggested that this relationship may increase with ability (Englert & Thomas, in press).

In conclusion, it is obvious that more research is needed to extend and clarify the current knowledge base concerning the use of text structure as a reading and writing strategy by individuals with learning disabilities. The findings previously discussed suggest several areas of needed research. First, more research is needed concerning how learning disabled individuals apply text structure to a variety of tasks. The use of metacognitive strategies is complex, yet most research has used a single task or measure as evidence of text structure use. Research is needed which uses multiple measures (Garner, Belcher, & Winfield, 1983) so that patterns of use can be observed. Further, these measures should incorporate both on-line and product evidence of text structure use (Baker & Brown, 1984) so that the relationships between strategy use and the outcome can be established.

Second, the nature of the relationship between text structure use in reading and writing needs to be explored. The single study

which was conducted concerning this relationship (Englert & Thomas, in press) failed to separate learning disabled students from their peers in calculating the correlation between text structure use in reading and writing. Consequently, no studies exist which have investigated this text structure relationship only for learning disabled students. Such information concerning the extent and development of this relationship will have important implications for the development of effective remediation programs.

Finally, research concerning text structure use by adolescents with learning disabilities needs to be investigated. With few exceptions, research on text structure use has not extended beyond elementary school-age students. Only one study has investigated text structure use by adolescents with learning disabilities (Blair & Crump, 1984). The lack of research concerning adolescents is particularly disturbing since the demand for reading and writing expository text increases dramatically when students reach adolescence.

## Research Hypotheses

The review of the literature indicates several needed areas of research relative to text structure use by individuals with learning disabilities. Based on the information derived from the literature concerning the three research questions presented in the Statement of the Problem, the following hypotheses were postulated.

1. Adolescents with learning disabilities will perform similarly to younger students, but less well than their

normally achieving peers, in their use of text structure strategy in reading.

2. Adolescents with learning disabilities will perform similarly to younger students, but less well than their normally achieving peers, in their use of text structure strategy in writing.
3. Adolescents with learning disabilities and younger students will show a weaker relationship between their use of text structure strategy in reading and writing than normally achieving adolescents.

## Definition of Terms

The following terms are defined for the purposes of this research:

1. Adolescents, for the purposes of this study, are individuals between the ages of 12 and 15 years.
2. Comparison-contrast text structure specifies the likenesses and differences between two or more items.
4. Comprehension monitoring entails a strategy for continually evaluating and regulating the comprehension process using a 2-step process in which the reader 1) keeps track of how comprehension is proceeding and 2) ensures that the comprehension process continues smoothly by taking corrective action when comprehension falters.

5. Distractor paragraphs are those which follow the format used for the reading stimuli with the exception that the inconsistent sentence is embedded in other than the fourth position.
6. Error detection refers to identification of sentences inconsistent with the prevailing text structure of the paragraphs.
7. Expository text is text in which factual, nonfiction information is presented.
8. An inactive learner is an individual who fails to select and implement appropriate strategies to promote learning.
9. Inconsistent sentences include sentences embedded in the fourth position of six of the reading paragraphs which are inconsistent with the prevailing text structure of the paragraph.
10. Learning disabilities, as defined by PL 94-142, means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, or mental retardation, or of environmental, cultural, or economic disadvantage.

11. Metacognition refers to what the learner knows about cognition and the ability to planfully control and monitor these cognitions.

12. Normally achieving students are those enrolled in regular classrooms who 1) scored within one standard deviation for their grade level on the Reading Comprehension subtest of the Comprehensive Test of Basic Skills (CTBS) (1981) and/or the Kentucky Essential Skills Test (KEST) (1985) and 2) scored between 80-105 according to the derived IQ obtained on the KEST. As a final check, students had to score within one standard deviation on the Reading Comprehension subtest of the Stanford Diagnostic Reading Test (SDRT) (Karlesen & Gardner, 1985) which was administered during the experiment. Those enrolled in a self-contained or resource classroom for special education services did not qualify as regular education students.

13. Sequence text structure involves the serial presentation of a number of steps or ideas in a continuous progression as they pertain to a process or event.

14. Students with learning disabilities are those identified by the school system as having learning disabilities in accordance with P. L. 94-142 regulations. To qualify for this study, students also had to score within the average range on the most recently administered intelligence test and score within one standard deviation of fourth grade students on the Reading Comprehension subtest of the SDRT.

15. Text structure refers to the overall organization of text.

16. Text structure strategy involves using one's knowledge of the structure of text as a method for enhancing reading and writing skills.

# CHAPTER 2

# METHODS

The purpose of this chapter is to describe the methods used in the present study. The major areas to be addressed include: 1) subjects; 2) setting; 3) instrumentation; 4) procedures; and 5) research design and analysis of the data.

## Subjects

Forty-five subjects, 15 in each of three groups, participated in the study. All subjects were enrolled in the Jessamine County School system, which is located in a rural community near Lexington, Kentucky. Since the size of the available subject pool varied widely for the three groups, selection procedures differed for each group. Subjects selected for the study met specific requirements pertaining to diagnostic classification, grade level, chronological age, and performance on intelligence and reading comprehension tests according to the respective groups. Subject selection procedures and a description of group characteristics are provided below.

### Subject Selection Procedures

Group 1. Subjects in Group 1 included 15 adolescents with learning disabilities. Subjects were selected from the 42 seventh and eighth grade students identified by Jessamine County Middle School as having learning disabilities in accordance with procedures established in compliance with P. L.94-142 regulations.

To be eligible for participation in the study, students also had to show evidence of functioning within the average range of

intelligence as measured by the most recently administered Wechsler Intelligence Scale for Children - Revised (WISC-R) (Wechsler, 1974). Additionally, students had to score within one standard deviation of fourth grade students tested in Spring, Grade 4 on the Reading Comprehension subtest of the Stanford Diagnostic Reading Scales (SDRT), Green Level, form G (Karlesen & Gardner, 1985). This subtest was administered by the investigator less than three weeks prior to the onset of the study. Finally, school records had to indicate that the student had no other handicapping conditions which might be the primary cause of learning difficulties, such as hearing loss or vision problems.

Using these criteria, 20 of the original 42 students qualified for the study. The parents of the 20 students were mailed informed consent forms and 15 parents gave permission for their child to participate. A copy of the informed consent form is in Appendix A. The 15 students who were given approval to participate comprised the final group of subjects.

Group 2. Group 2 consisted of 15 normally achieving fourth graders identified as average readers for their grade level. Subjects were selected from approximately 100 fourth grade students enrolled at Warner Elementary School.

School records were examined and students were identified who: 1) scored within one standard deviation for their grade level on the Reading Comprehension subtest of the Comprehensive Test of Basic Skills (CTBS) (1981) and/or the Kentucky Essential Skills Test (KEST)

(1985) over the two previous years and 2) scored between 80-105 according to the derived IQ obtained on the KEST administered in April, 1985. The purpose for the restricted range in IQ scores was to attempt to match, as closely as possible, the IQ scores of the group with learning disabilities; no student in the group with learning disabilities obtained a Full Scale score above 104 on the WISC-R. Although derived scores are a much less reliable measure of intelligence than individually administered intelligence tests, such as the WISC-R, they were the only IQ scores available for these students. Likewise, although it would have been preferable to administer the Reading Comprehension subtest of the SDRT to these students as a prior measure of reading comprehension skill, scheduling problems did not permit it. Instead, the subtest was administered to students who participated in the study to verify their reading level. Finally, as in Group 1, examination of school records had to show no significant hearing loss or vision problems.

Once the criteria for intelligence test and reading comprehension scores were applied, 27 students remained eligible for the study. Of these students, the 18 who were granted parental permission to participate in the project were tested. After administering the Reading Comprehension subtest of the SDRT, Green Level, form G, only students who scored within one standard deviation of fourth grade students tested in Spring of Grade 4 were included in the final group of subjects. Since only 14 students met this qualification, the student who scored closest to one standard

deviation from the mean was included for a total of 15 subjects. This final student achieved a grade equivalence of 2.4 which was only slightly below the lower cut-off of 2.6 for those who scored within one standard deviation.

Group 3. Group 3 consisted of 15 normally achieving adolescents identified as average readers for their grade level. Subjects were selected from 800 seventh and eighth graders enrolled at Jessamine County Middle School. Because of the large number of students, the procedure used for selection was different than that used for the fourth grade subjects. Initially, 100 students were randomly selected from the two grades and students were identified who qualified for the study. However, when this process yielded only 15 qualified students, the selection was extended to include 200 students.

Similar to the criteria used for Group 2, potential subjects in this group had to: 1) score within one standard deviation for their grade level on the Reading Comprehension subtest of the CTBS and/or the KEST over the past two years; and 2) score between 80-105 according to the derived IQ score obtained on the KEST administered in April, 1985. Finally, only students who showed no evidence of significant impairment which might interfere with academic performance, such as hearing loss or vision problems, were eligible. School records were examined for the above information.

Using these criteria, 36 students qualified as subjects and informed consent forms were mailed to the parents. Of this group,

the 20 students who were given parental permission were tested. Similar to the procedure followed for the fourth grade students, students who were tested were administered the Reading Comprehension subtest of the SDRT, Brown Level, form G. The two students who failed to score within one standard deviation for their grade level on this subtest were eliminated from the final group of subjects. Of the remaining 18 students, three were randomly discarded so that 15 students comprised the final group of subjects.

Demographic Data for Groups

The final group of adolescents with learning disabilities consisted of nine seventh graders and six eighth graders with a mean chronological age of 13.8. Eleven males and four females participated in the study. Although there was no attempt to control for sex, it is worth noting that the ratio of males to females is consistent with research showing that more males than females are identified as having learning disabilities (Morsink, 1985). Results of the Reading Comprehension subtest of the SDRT revealed a mean reading level of 4.7. The mean full scale IQ score on the WISC-R, administered between February, 1983, and May 1985, was 85.

The fourth grade subjects in Group 2 included eight males and seven females with a mean age was 9.5. According to scores obtained on the Reading Comprehension subtest of the SDRT, the mean reading level of the group was 4.3. The mean derived IQ score on the KEST was 93.6.

The normally achieving adolescent subjects consisted of eight seventh-grade and seven eighth-grade students. Six were male and nine were female. The mean age of these subjects was 13.0. Results of the Reading Comprehension subtest of the SDRT yielded a mean reading level for the group of 7.2. The mean derived IQ score on the KEST was 96.1.

Table 1 displays the means and standard deviations for the reading comprehension grade levels, intelligence test scores, and chronological ages for all groups.

Table 1

Means and Standard Deviations for Reading Comprehension Grade Levels, Intelligence Test Scores, and Chronological Ages for Groups

| Group | Reading Comprehension Grade Level | Intelligence Test Score | Chronological Age |
|---|---|---|---|
| Learning Disabilities (n = 15) | | | |
| Mean | 4.66 | 85.00 | 13.77 |
| SD | 2.11 | 6.23 | .95 |
| Fourth Grade (n = 15) | | | |
| Mean | 4.32 | 93.60 | 9.46 |
| SD | 1.94 | 6.91 | .50 |
| Seventh, Eighth Grade (n = 15) | | | |
| Mean | 7.22 | 96.13 | 12.97 |
| SD | 2.52 | 4.98 | .78 |

The criteria for subject selection were intended to ensure that the adolescents with learning disabilities and fourth grade students

would be of similar reading ability; whereas, the normally achieving students would be of higher reading ability. To confirm that groups formed by these procedures displayed the desired reading abilities, an analysis of variance was performed on the Reading Comprehension subtest scores of the three groups. As expected, results revealed statistically significant differences for groups, $F$ (2, 42) = 7.77, $p < .001$. The Tukey multiple comparison procedure (Kirk, 1968) then was used to determine the source of these differences. Results showed that the mean reading levels of students with learning disabilities (M = 4.66, SD = 2.11) and fourth grade students (M = 4.32, SD = 1.94) were not significantly different, but the mean reading level of normally achieving adolescents (M = 7.22, SD = 2.52) was significantly higher than that of the other groups.

An analysis of variance procedure was also performed on IQ scores of the three groups to determine the presence of significant differences between group mean IQ scores. Selection criteria were developed in an attempt to minimize IQ differences, and it was hoped that the analysis would reveal no significant differences. However, results of the test revealed differences for group, $F$ (2, 42) = 13.74, $p < .0001$. Results of the Tukey multiple comparison procedure showed that the mean IQ score of students with learning disabilities (M = 85, SD = 6.23) was significantly lower than that of the fourth graders (M = 93.6, SD = 6.91) or normally achieving adolescents (M = 96.13, SD = 4.98). However, these findings must be interpreted with caution since the it is well known that derived IQ scores are

considerably less accurate than individually administered IQ tests in measuring intelligence (Salvia & Ysseldyke, 1981).

Finally, an analysis of variance was performed on the mean chronological age of groups to ascertain significant differences. Based on the stated selection criteria, it was assumed that significant differences would be found and that the source of the difference would be the significantly lower mean age for the fourth grade group compared to the other two groups. As expected, there were significant differences for group, $F$ (2, 42) = 132.99, $p$ < .0001. Results of the ensuing Tukey multiple comparison procedure showed significant differences between all groups. The unanticipated age difference between normally achieving adolescents (M = 12.97, SD = .78) and the students with learning disabilities (M = 13.77, SD = .95) suggested that the group of students with learning disabilities included more students who had been retained than the group of normally achieving adolescents.

## Setting

### Reading Task

The reading activity for adolescents with learning disabilities and normally achieving adolescents was conducted in an area of the audio-visual room next to the Middle School library. The area contained a six-foot long table and two chairs which were placed on the same side of the table near each end. An Apple IIe micromputer, a disk drive, and a green phosphorous monitor were placed at each end of the table. When students were seated at the microcomputers, they

were approximately five feet apart. The investigator sat about two feet behind the students and midway between them. During procedural reliability checks, the data collector sat in a chair next to the investigator.

Although teachers were asked not to interrupt during the reading sessions, teachers and staff occasionally entered the room. Intermittent auditory distractions were noted between class periods when students congregated in the hallway adjacent to the room. No attempt was made to move materials that might be visually distracting since the room was needed for storage. However, it was assumed that visual distractions were minimal since most materials were behind the students and out of the visual field.

The arrangement of equipment and personnel for fourth grade students was similar to that found in the Middle School with the exception that the reading tasks were conducted in the Elementary School teachers' lounge. A long bench of table height substituted for the table.

During the reading activity, teachers honored the request not to interrupt by entering the room or knocking on the door. Few auditory distractions were observed since the lounge area was removed from heavy traffic areas. Visual distractions were also minimal since students faced a wall.

Writing Task

The adolescents with learning disabilities and the normally achieving adolescents completed the writing task in a conference room

adjacent to the counselors' offices. The room contained two round tables, about six feet apart, each surrounded by four chairs. The investigator stood approximately equidistant between tables to give instructions and then circulated in the area as students wrote. Although all doors to the room were closed during the writing activity, occasional distractions were observed when students and counselors entered and left the offices.

Fourth grade students completed the writing activity at tables in the rear of the cafeteria. It was possible for as many as four students to sit on each side of a long table and still have sufficient writing space. The investigator stood at the end of the table to give instructions and circulated around the table behind the students as they wrote. The observor who collected procedural reliability data sat at a table adjacent to the one used by the students. Although the cafeteria was generally quiet, some noise was evident at the opposite end of the room on occasions when individual classes had morning snack.

## Instrumentation

### Reading Paragraphs

The 12 paragraphs used for the reading task included six items representing sequence text structure and six items representing comparison-contrast text structure. For the purposes of this research, sequence text structure was defined as the serial presentation of a number of steps or ideas in a continuous progression as they pertain to a process or event. Comparison-

contrast text was defined as specifying the likenesses or differences between two or more items (Englert & Hiebert, 1984). The steps undertaken to develop the reading task materials were as follows.

Topic Familiarity. The first step in developing the paragraphs involved the identification of appropriate paragraph topics. In order to minimize effects due to differences in background knowledge on reading and writing performance, the investigator attempted to select topics which were approximately of equal familiarity.

The initial set of topics was selected from supplementary reading materials used in the elementary grades, such as the Barnell Loft Specific Skill Series (Boning, 1978). Thirty six of the topics, 18 of each text type, were presented to the three fourth-grade teachers in the form of a Topic Familiarity Survey. The Survey, reproduced in Appendix B, contained a list of the topics and a scale for rating each topic from 1 (unfamiliar) to 5 (highly familiar). Teachers were instructed to circle the number which best represented how familiar they believed fourth grade students were with each topic. Only fourth grade teachers were used because it was assumed that topics familiar to fourth graders would be familiar to older students having more extensive background knowledge.

Teacher responses were totaled and topics were rank ordered from most to least familiar. The list of topics in rank order and mean familiarity scores according to text type are found in Table 2. This information was used to select the more familiar topics of similar ranking for use in developing the reading and writing materials.

However, some exceptions were necessary due to several constraints which are described later in this section.

Table 2

Rank Order and Mean Familiarity Scores for Topics

| Comparison-Contrast | | Sequence | |
|---|---|---|---|
| Topic | Mean Score | Topic | Mean Score |
| Winter & Summer | 4.67[a] | Making a Snowman | 4.67 |
| Plants & Animals | 4.67 | Making a Sandwich | 4.67 |
| Mittens & Gloves | 4.67 | Riding a Bus | 4.34 |
| Firefighters & Police | 4.34 | Growth of Butterfly | 4.00 |
| Ships & Planes | 4.34 | Served at Restaurant | 4.00 |
| Whales & Humans | 3.67 | Washing Clothes | 3.67 |
| Moon & Sun | 3.67 | Buying Food at Grocery | 3.34 |
| Lions & Cats | 3.67 | Making a Cake | 3.00 |
| Deserts & Forests | 3.67 | Treating Cuts | 3.00 |
| Birds & Snakes | 3.67 | Cutting Hair | 3.00 |
| Tornados & Hurricanes | 3.34 | Painting Preparation | 3.00 |
| Cockroaches & Mosquitos | 3.00 | Growing Crops | 2.67 |
| Moths & Butterflies | 2.67 | Putting Out Fires | 2.67 |
| Wolves & Dogs | 2.67 | Hail Formation | 2.34 |
| Frogs & Toads | 2.67 | Baby Development | 2.00 |
| Cowboys-Yesterday & Today | 2.34 | Volcano Development | 1.67 |
| Trolleys & Busses | 2.00 | Rescue Drowning Person | 1.34 |
| Squirrels-Ground & Tree | 1.34 | Making Maple Syrup | 1.34 |

[a]maximum score = 5

Text structure. The next step in the process required the development of paragraphs which represented the desired sequence or comparison-contrast text structure. Each paragraph was written so that it contained a title, a topic sentence, and four supporting detail sentences. The topic sentence was constructed so that it signaled both the content and structure of the paragraph, and the

remaining sentences provided relevant details consistent with the topic sentence. The purpose of using a uniform format was to control for reading differences related to variations in paragraph features, such as presence or absence of titles, location and content of topic sentences, and paragraph length (Armbruster, 1984). To minimize effects due to word recognition problems or difficulties in understanding complex syntactic structures, an attempt was made to ensure that the readability of paragraphs was maintained well below the subjects' reading level.

To validate that the 12 paragraphs represented the desired sequence or comparison-contrast text structure, five mature readers (faculty members and doctoral students) were asked to classify the 12 paragraphs according to text structure type. Readers were first provided written instructions concerning the characteristics of sequence and comparison-contrast text structures followed by examples. They were then asked to read the paragraphs and classify them according to text type. The instructions, which were attached to the front of the stimulus paragraphs, are included in Appendix C. Using this procedure, readers classified the paragraphs with 100% accuracy.

Inconsistent Sentences. The third step in the development of the paragraphs involved embedding sentences containing text structure inconsistencies. To accomplish this task, each sequence paragraph was paired with a comparison-contrast paragraph so that there were six sets of paragraphs. For three of the sets, the fourth sentence

of each sequence paragraph was altered so that it matched the fourth sentence of its comparison-contrast counterpart with the possible exception of one or two key words. For the remaining three sets, the fourth sentence of each comparison-contrast paragraph was changed so that it matched the fourth sentence of its sequence paragraph pair. Thus, half of the paragraphs of each text type contained an anomalous sentence representing the alternate text type. Further, the anomalous sentence was found intact, or nearly so, in a paragraph representing the alternate text structure.

To ensure that the inconsistent sentences were sufficiently distracting to be detected by mature readers, five skilled readers were asked to read the paragraphs and identify any sentences which did not fit. The readers consisted of faculty members and doctoral students in the special education program. In a procedure similar to that used for assessing text structure, readers were provided both written instructions concerning the text and examples of text with and without text structure inconsistencies. Appendix D contains the instructions provided to the readers. Readers were then asked to identify any sentences in the 12 paragraphs which were inconsistent. Readers were also encouraged to write any comments regarding the paragraphs and sentences which might be helpful to the investigator.

During administration of the detection task, problems with several sentences emerged. In some instances, sentences which were not intended to be inconsistent were identified as such, and others which were intended to be inconsistent were not detected. The

investigator made modifications based on reader feedback and submitted the revised materials to another group of five skilled readers. During the second administration, the inconsistent sentences were found with 100% accuracy, except for one paragraph (Wolves & Dogs), in which the inconsistent sentence was undetected by one reader.

Characteristics of final reading paragraphs. The 12 paragraphs used in the reading task are displayed in their final form in Appendix E. Mean readability levels (Spache, 1953) and familiarity scores were calculated and are reported for each paragraph in Table 3.

Table 3

Readability Levels and Familiarity Scores and for Reading Paragraphs

| Comparison-Contrast | | | Sequence | | |
|---|---|---|---|---|---|
| Title | Readability Level | Familiarity Score | Title | Readability Level | Familiarity Score |
| Lions & Cats | 2.52[a] | 3.67[b] | Treat Cuts | 2.28 | 3.00 |
| Wolves & Dogs | 2.29 | 2.67 | Restaurant | 2.45 | 4.00 |
| Frogs & Toads | 2.45 | 2.67 | Paint Wood | 2.12 | 3.00 |
| Whales & People | 2.33 | 3.67 | Butterfly | 2.49 | 4.00 |
| Ships & Planes | 2.45 | 4.34 | Riding Bus | 2.23 | 4.34 |
| Winter & Summer | 1.99 | 4.67 | Plant Crops | 2.04 | 2.67 |

[a]by grade [b]maximum score = 5

Examination of mean scores indicates that the readability level for sequence paragraphs was slightly easier at 2.28 than for

comparison-contrast paragraphs at 2.33. However, sequence paragraph topics were slightly less familiar than comparison-contrast paragraphs as indicated by the mean familiarity scores of 3.50 and 3.61, respectively.

Distractor paragraphs. To minimize the development of task specific strategies in which students might observe that inconsistencies always occurred in the fourth sentence, three distractor paragraphs were developed. These paragraphs followed the format used for the experimental paragraphs; that is, the paragraphs consisted of a title, topic sentence, and four supporting detail sentences. However, for each paragraph one supporting detail sentence in the second, third, or fifth position was replaced with a sentence which was inconsistent with the paragraph. To ensure that the inconsistent sentences were salient, five mature readers were asked to identify any inconsistent sentences using the procedure described previously. All inconsistent sentences were identified with 100% accuracy. The three distractor paragraphs are located in Appendix F.

Comprehension questions

Twenty-four multiple-choice questions, two for each reading paragraph, were also developed. Each question contained three response choices. The format used for developing questions closely approximated the rote wh- question type proposed by Bormouth (1969). Rote wh- questions are created by deleting a word or words from a target sentence and replacing the word(s) with the appropriate wh-

word, such as "who, what, when, where," or "why." Then, the wh- word is shifted to the front of the question and adjustments in verb forms are made as needed in order for the question to be syntactically correct.

Development of text dependent questions. To use questions as a measure of comprehension, it was important to develop questions which could only be answered by reading the paragraphs; that is, the questions had to be text dependent. Since the questions contained three response choices, it was assumed that questions answered at or below chance level of accuracy (34%) without reading the accompanying paragraphs qualified as text dependent.

To validate that questions were text dependent, three skilled readers (graduate students in special education) were asked to read and answer the first set of questions developed by the investigator without reading the related paragraphs. Readers were provided written rationale and instructions for the task. These are located in Appendix G. Them they were instructed to answer the 24 questions attached to the instruction sheet.

Using the 34% criterion level of accuracy, only 10 questions qualified as text dependent. Consequently, the remaining 14 questions were revised. However, the attempt to develop context dependent questions was again unsuccessful. Administration of the second set of questions to another group of three skilled readers yielded only 12 questions which met the qualification for text dependency.

Based on results of the first two attempts to develop questions, it appeared that the high familiarity of the paragraph topics made it extremely difficult to devise questions which contained only one correct answer and which could only be answered by reading the paragraph. Consequently, a third set of questions was created in which all answers were plausible, but only one was correct based on what was presented in the paragraph. Questions of this sort have an important limitation in that they require that readers be able to incorporate their background knowledge in determining the correct answer and that they also be able to sort out which specific plausible answer is found in the reading paragraph. Thus, the task becomes one of both comprehension and discrimination. However, this task is a valid one which is important to school success (Raphael & Pearson, 1985; Raphael & Wonnacott, 1985).

The set of questions rewritten according to the new format was submitted to a different group of five readers according to the procedure previously described. Using a criterion level of 40% accuracy or less, only seven questions of the 24 questions qualified as text dependent.

Questions were rewritten a fourth time and administered to five new readers. Twelve of the rewritten questions qualified as text dependent. Six questions were answered with 60% accuracy, five with 80% accuracy, and one with 100% accuracy. Although the accuracy rate for these 12 questions was still higher than desired, the investigator felt that reasonable options were exhausted. In

addition, it was assumed that these findings represented a conservative estimate of text dependency since the questions were submitted to adults who were likely to have much greater background knowledge of these topics than the students who participated in the study. Thus, the fourth set of questions was used in the study despite the fact that many did not meet the stated qualifications for text dependency.

The list of final questions and percent correct reponses for each question are presented in Appendix H.

Writing Stimuli

The six stimuli used for the writing task consisted of three sequence and three comparison-contrast stems. The steps used to develop the writing materials are described below.

Topic familiarity. To minimize the influence of background knowledge on writing performance, the six topics selected for the writing stimuli were among those ranked as most familiar to fourth grade students according to results of the Topic Familiarity Survey administered to fourth grade teachers. In addition, no topics were used that overlapped with any reading paragraphs or examples used to train students in the reading and writing tasks.

Development of writing stimuli. Each of the initial six writing items contained a title, a topic sentence indicating the content and structure of the paragraph, and a supporting detail sentence consistent with the topic sentence. To ensure that the writing task could be successfully accomplished by skilled writers, five special

education graduate students were asked to perform the activity. The students were provided instructions (see Appendix I) to read each stimulus item and then write two more sentences which best completed the paragraphs.

The scoring system developed by Englert et al. (1985) was used to evaluate the completed passages. For a writing item to be acceptable for use in the study, the item had to obtain 9 of 10 possible total points (two points per item multiplied by five judges). Using this criteria, only two of the original six items met the requirement.

An examination of the items completed by skilled writers suggested that the provision of supporting detail sentences may have served to distract rather than aid the writer. That is, writers often attempted to write sentences which not only followed the topic sentence, but the supporting sentence as well. In response to this problem, stimuli were revised so that the supporting detail sentence was eliminated. The revised items were submitted to another group of five skilled writers. The presentation procedure described previously was again followed. Scores on the revised stimuli met the criteria of at least 90% of the maximum possible points.

Final writing stimuli. The six writing items were typed, double-spaced on separate pages. Space for students to write their sentences was provided on blank lines which followed the topic sentence. The stimuli were randomly ordered and stapled in booklet form for each student with a sample practice item attached to the

front. Appendix J displays the writing items as they were presented to students.

The mean familiarity score for the sequence items was slightly less than that for the comparison-contrast items, at 3.89 and 4.00, respectively. Table 4 shows the mean familiarity scores for each writing stimulus.

Table 4

Mean Familiarity Scores for Writing Stimuli

| Comparison-Contrast | | Sequence | |
|---|---|---|---|
| Title | Familiarity Score | Title | Familiarity Score |
| Forests and Deserts | 3.67[a] | Making a Sandwich | 4.67 |
| Plants and Animals | 4.67 | Buying Food | 3.34 |
| Moon and Sun | 3.67 | Washing Clothes | 3.67 |

[a]maximum score = 5

Computer program

The reading paragraphs and comprehension questions were presented in the context of a computer program designed specifically for the research project. The program was developed by Blackhurst (1985) using the "Apple SuperPILOT" computer assisted instruction authoring language (Apple Computer, 1982) for use on the Apple II series of microcomputers. Characteristics of the program and procedures for field testing are provided below.

Characteristics of the computer program. The computer program included two major components. The first component involved the instructions and activities related to reading the paragraphs and answering the comprehension questions. The second component included instructions and activites concerning the detection of sentence inconsistencies in the paragraphs previously read in the first component.

The first component began by requiring subjects to enter their first and last names. Then specific instructions concerning the procedures for reading the paragraphs and answering the questions were given. (Specific content of the instructions is located in the Procedure section.) Opportunities were provided for students to practice the procedures for moving on to the next sentence in the paragraph, using lookbacks, and answering questions. The program was designed so that correct student responses were praised, while error responses resulted in an explanation of the task and provision of the correct answer followed by another opportunity to practice the response correctly. Instructions and practice items were self-paced.

After instructions were read and practice items were completed satisfactorily, the paragraphs and questions were presented. The 12 experimental paragraphs were presented in random order as determined by the program. The three distractor paragraphs were always presented in positions 3, 6, and 9 for reasons presented in the Procedure section. Each paragraph was displayed so that the title and topic sentence first appeared at the top of the screen. The

bottom of the screen contained instructions for the student to "Press any key to GO ON or Press R to REVIEW". The program was error trapped so that the program did not proceed unless the designated keys were pressed.

If any key except R was pressed, the preceding sentence faded, and the next sentence apeared beginning at the point where the previous sentence stopped. Selection of the R key resulted in the presentation of the entire paragraph up to and including the sentence displayed when the R key was pressed. The program was designed so that the student could select the REVIEW option only once for each of the last four sentences. (Obviously, the REVIEW option could not be designated on the first sentence of the paragraphs.)

At the end of the paragraph, the computer presented the two multiple choice questions separately. Each question and the three choices were displayed on the screen accompanied by instructions at the bottom of the screen to "TYPE THE NUMBER OF THE RIGHT ANSWER". As before, the pressing of any button other than 1, 2, or 3 resulted in a reminder that only one of those buttons could be pushed in response to the question.

Following the presentation of all paragraphs and questions, students were instructed to take a break. A press of the RETURN key was required to begin the second component of the program. Similar to the first component, the second component began with self-paced instructions and practice opportunities relative to the error detection task. Students' responses to practice items were evaluated

as described in the first component. Once the instructions and practice items were successfully completed, presentation of the paragraphs began.

The paragraphs were presented in the same order for the first and second components. For this task, each paragraph was displayed in its entirety, with the title at the top and the sentences numbered and placed, double-spaced, below one another. The question "Do all the sentences fit? (Y or N)" appeared at the bottom of the screen. If the student answered "N", an instruction appeared which said, "Type the number of the sentence that does not fit." This portion of the program was error trapped in the manner described for the first component. The procedure was repeated until all paragraphs were presented.

The computer recorded and printed out on request detailed information concerning reading time, use of lookbacks, responses to questions, and detection of inconsistent sentences for each student. Reading time to the ten-thousandth of a second was recorded for each sentence and lookback of the paragraphs. The presence or absence of a lookback was recorded for the last four sentences of each paragraph. The computer also recorded subject responses for all multiple choice questions and for questions related to detection of inconsistent sentences.

Field testing. The computer program was field tested to identify needed modifications in the program prior to its use in the study. The program was administered individually to six regular

education students (three fourth grade, one seventh grade, and two eighth grade) who volunteered for the task. Before beginning the activity, students were instructed to ask questions and make comments regarding the program and its content at any time during the task. As students proceeded through the program, the investigator recorded student comments and questions and observed student behavior. In addition, time for task completion was noted. After students completed the program, the investigator solicited feedback. Although no formal feedback instrument was used, all students were asked to comment on the content and clarity of the instruction and practice phases of the program and on the time required for task completion.

Based on student feedback and observed student behavior, two major modifications were made in the program. First, fewer practice opportunities were provided during the instruction and practice phases. The purpose of this change was to reduce confusion concerning the experimental tasks. According to students, the multiple practice opportunities served to muddle, rather than clarify, the procedures. Further, they expressed frustration at having to repeat an activity they already knew how to do. These comments were supported by investigator observation of student behavior. Another benefit of fewer practice opportunities was reduced administration time. Although no students expressed concern at the time required to complete the program (50-75 minutes), the investigator noted that some students seemed less attentive toward the end of the program.

The second modification in the progam involved varying practice paragraphs so that they ranged in length from three to five sentences. The purpose of this change was to eliminate the strategy used by two students in which they quickly proceeded through the first four sentences without reading them and then used the lookback option on the fifth sentence. This procedure allowed students to view paragraphs in their entirety before answering the comprehension questions. Although this practice certainly provided evidence of use of a reading comprehension strategy, it threatened the validity of the dependent variables of reading time and lookbacks as measures of text structure awareness; that is, instead of reading time and lookbacks varying as a function of sentence inconsistencies, they were applied according to the strategy just described.

Writing Assessment Tool

Performance on the writing task was measured using the scoring system developed by Hiebert et al. (1983). According to the scale, each sentence was assigned a value from 0 to 2 based on its conformity to topic and text structure requirements and its acceptability as a related detail sentence. Points for each sentence were then summed to obtain a total score for each paragraph.

Appendix K shows the scoring scheme and sample student responses.

## Procedures

### Reading task

The reading task was administered to pairs of subjects by the investigator, with the exception of four occasions when subjects completed the task individually due to scheduling problems. Completion time for the entire reading activity ranged from approximately 60 to 90 minutes.

During each administration of the reading task, the investigator closely adhered to the instructions and procedures enumerated in the Reading Protocol in Appendix L. The Protocol, which was developed by the investigator, served two functions. First, it minimized differences in subject performance due to variations in instructions and procedures between task administrations. Second, the Protocol provided a means for assessing procedural reliability.

Upon entering the room, subjects were asked to be seated at one of the computers and to listen for instructions. Students were told that they were about to begin a reading activity on the computer which would take about an hour to complete. They were also informed that a writing activity would be conducted at a later date.

Subjects then were asked to read a word list and complete the Topic Familiarity Survey. Subjects each read aloud a list of 43 words found in the reading paragraphs and comprehension questions, but not contained in the Spache (1953) list of familiar words. The purpose of this task was to ensure that performance would not be affected by problems in word identification. Alternate word lists

differing only in word order were used for each subject to minimize opportunities for memorizing the list by the second reader. The two forms of the word list are found in Appendix M.

The procedure for reading the word list required that both the subject and investigator have identical forms of the list. As the subject read the words, the investigator circled any errors on her form. When the subject completed reading the list, the investigator corrected any errors and then asked the subject to read the missed words aloud. For any words missed a second time, the procedure was again repeated until the subject read all words correctly.

Subjects also completed a Topic Familiarity Survey in which they circled a number from 1 to 5 which best described how much they knew about the 18 topics used for the reading and writing tasks. The purpose of this task was to ascertain the influence of topic familiarity on task performance. A copy of the Survey is in Appendix N.

After completing the preliminary word list and Survey tasks, subjects were asked to read the reading task instructions on the microcomputer. The investigator encouraged subjects to ask questions regarding the instructions at any point. The instructions stated that subjects would be asked to read a set of paragraphs or stories presented sentence-by-sentence on the microcomputer. They were urged to read carefully so that they might correctly answer the two comprehension questions presented at the end of each story. Subjects

were also informed that they could control how much time they spent on each sentence and that they could review previously read portions of the paragraphs or proceed to the next sentence as desired. Opportunities were provided for subjects to practice these procedures on a sample paragraph.

After completing the practice paragraph, subjects were presented two sample multiple-choice comprehension questions with three response choices. They were informed that although more than one answer might seem correct, they were to give the answer found in the paragraph they had just read. Feedback was provided concerning the correctness of their responses.

When both subjects completed the instructions and examples, they were provided another opportunity to ask questions of the investigator. They also were informed that questions concerning the content of the paragraphs or questions would not be answered once they began the reading activity. The investigator then signaled both subjects to begin the reading task.

After subjects read all 12 target and three distractor paragraphs and answered the questions, they took a break before beginning the second part of the task. This part of the task involved a second presentation of the paragraphs in which students were cued that inconsistencies might be present. Instructions for this part of the task were also presented on the microcomputer, and subjects again were urged to ask questions. The instructions began by informing subjects that some of the paragraphs they had just read

contained sentences which did not fit in the paragraph. They were told that their task during this part of the activity was to identify these sentences. Following the explanation of the procedure for performing this task, opportunities for practice were provided.

Similar to the first part of the task, opportunity for asking additional questions was provided after both subjects finished the instructions. They were informed that questions concerning paragraph content or sentence fit would not be answered once they began the task.

After all questions were answered, subjects read and evaluated the sentence fit of the 15 paragraphs they had read during the first part of the task. On completion of this task, subjects were dismissed to their classes with a reminder that they would return at a later date to complete the writing task.

Writing Task

The writing task was administered by the investigator to subjects singly and in groups up to eight. The variation in group size was related to scheduling factors. Time for completion of the writing task ranged from approximately 15 to 20 minutes.

Instructions and procedures for the writing task closely followed those stated in the Writing Protocol found in Appendix O. After being seated, subjects were told that they would be participating in a 20-30 minute writing task. In addition, subjects who had not yet taken the Reading Comprehension subtest of the SDRT

were also informed that the reading test would be given following the writing activity.

Each student was given a seven page booklet containing a practice item and six test items. Subjects were told that each page of the booklet contained a title and the first sentence of a paragraph. Their job was to write two more sentences which best completed each paragraph.

Subjects then were asked to complete the practice item and share their sentences. During the discussion of subjects' responses, the investigator pointed out that there were many ways to complete the paragraph so that it made sense. The investigator encouraged subjects to ask questions during the instruction and practice phase.

After all questions were answered, subjects were instructed to turn to the next page which contained the first writing stem. The investigator read the title and first sentence aloud and told subjects to write two sentences which best completed the paragraph. When all subjects finished writing, they were instructed to turn to the next page and the process was repeated. Consequently, subjects were paced so that the group proceeded together through the booklet. After all paragraphs were completed, the investigator collected the booklets and explained the project to the students.

Procedural Reliability

Procedural reliability checks were conducted to ensure that the investigator implemented the procedures as planned. These checks were conducted on ten percent of the reading sessions and ten percent

of the writing sessions. The checks were completed by special education graduate students enrolled in a research methods course. Each data collector was provided a copy of the Reading and Writing Protocols and a checklist which listed the critical features of the Protocols. During administration of the tasks, data collectors noted whether the procedure was implemented accurately (+) or inaccurately (-). If no opportunity was available for implementation of the procedure, the item was left blank. Examples of the procedural reliability data collection sheets are included in Appendix P.

Data were reported as percent compliance with the planned procedures. A point-by-point method of calculating agreement was used; the specific formula is the number of agreements divided by the number of agreements plus the number of disagreements multiplied by 100 (Gast & Tawney, 1984).

## Research Design and Analysis of the Data

The data obtained using the procedures described were analyzed in two steps. The first step consisted of a preliminary analysis to gain a general understanding of student performance on the tasks and to determine the effects of topic knowledge on student performance. Examination of distribution of scores was used to assess student performance. To determine the effects of topic knowledge on student performance, Pearson product moment correlations were calculated for student ratings on the Topic Familiarity Scale and the dependent measures for each paragraph or writing stimulus.

The second step in the procedure involved conducting analyses relative to each research hypothesis. A brief outline of the data analysis procedures for the hypotheses follows.

Reading Task

The research design used in the reading portion of the present study was a 3 (group: learning disabled adolescents, fourth graders, normally achieving peers) X 2 (text: sequence, comparison-contrast) X 2 (consistency: consistent, inconsistent) analysis of variance (ANOVA) with repeated measures on the last two factors. Data were analyzed for the following dependent variables: 1) reading time; 2) use of lookbacks; 3) identification of inconsistencies; and 4) responses to comprehension questions. As noted previously, data for these variables were collected with a microcomputer. Operational definitions of the variables are as follows:

Reading time. Reading time was defined as time elapsed between key presses for each sentence; that is, it was the amount of time from the moment a sentence was selected by pressing a key to the time when either the "R" (Review) key or another key was pressed to proceed to the next sentence.

Use of lookbacks. The use of lookbacks referred to pressing the "R" (Review) key in order to re-examine the preceding text.

Identification of inconsistent sentences. Identification of inconsistent sentences was defined as a two-step process in which 1) a "no" response was made in answer to the question of whether all sentences fit in the paragraph, and 2) the correct number key was

pressed in response to the question asking which sentence did not fit for paragraphs which contained inconsistent sentences. Correct identification of consistent sentences involved a "yes" response to the question of whether all sentences fit in the paragraph for paragraphs which did not contain inconsistent sentences.

Answers to comprehension questions. Correct answers to comprehension questions involved pressing the key corresponding to the correct answer on a multiple choice question presented on the microcomputer.

For the first part of the analysis, the four reading measures were correlated to determine whether they should be included in a single multivariate analysis of variance (MANOVA) or whether each variable should be considered separately using individual analysis of variance (ANOVA) procedures. According to Finn (1974), this decision is largely based on the extent of the correlations among dependent variables. Whereas moderate to high correlations among dependent variables suggest the need to consider the variables simultaneously in a MANOVA procedure, low correlations suggest that separate ANOVA procedures for each dependent variable are more appropriate.

Based on the low correlation coefficients obtained using this procedures, it was decided to perform separate ANOVA's on each variable. When results of the ANOVA procedure yielded significant differences requiring a post hoc analysis, tests of simple effects (Dixon, 1983) and the Tukey (Kirk, 1968) multiple comparison

procedure were used. An alpha level of .05 was used as the level of statistical significance for each analysis.

Writing Task

The design for the writing section of the research was a 3 (group: learning disabled adolescents, fourth graders, normally achieving adolescents) X 2 (text: sequence, comparison-contrast) analysis of variance (ANOVA) with repeated measures on he last factor. The analysis was conducted for the scores obtained on the paragraph completion task. The investigator assigned a score between 0 and 4 for each paragraph using the criteria established by Hiebert et al. (1983) which are described in the Instrumentation section:

Interrater reliability checks for scores obtained on the writing task were conducted to control for scorer bias. A graduate student blind to the purposes of the study was trained in use of the scoreing system (Hiebert et al., 1983). Following training, ten percent of the writing protocols were randomly selected and scored by the student. Scores assigned by the investigator and the student then were evaluated using the point-by-point formula for calculating agreement (Gast & Tawney, 1984).

Relationship between Reading and Writing

For the third hypothesis, relationships between text structure use in reading and writing were analyzed by performing Pearson product moment correlations for each combination of reading and writing measures for each condition by group.

# CHAPTER 3

# RESULTS

This chapter presents results of the data analysis in two sections. The first section presents results of the preliminary analysis. This analysis includes a general overview of student performance on the tasks and an examination of the possible effects of prior knowledge on task performance. The second section provides a description of the statistical procedures and findings for the dependent variables relative to each hypothesis.

## Preliminary Analysis

### General Performance

The first purpose of the preliminary analysis was to gain a general understanding of how students performed on the various experimental tasks. To accomplish this purpose, the distribution patterns for each of the dependent variables for each of the four conditions were examined. The means, standard deviations, possible range of scores, and actual range of scores are reported in Table 5.

An examination of reading time data revealed that scores for this variable generally followed a normal distribution pattern. The wide range of reading time scores obtained across tasks suggests that these scores sometimes represented time spent in behaviors other than reading for some students - an interpretation which is confirmed by the experimenter's observation that some students engaged in various non-reading behaviors, such as searching the keyboard or looking around the room.

Although the reading time scores generally followed a normal distribution pattern, scores for lookbacks, identification of inconsistencies, and question answering typically did not. The distribution of scores for lookbacks under all conditions was negatively skewed. This distribution reflected a floor effect which resulted from the failure of many students to use any lookbacks.

Table 5

Summary Statistics for Dependent Variables

| Dependent Variable | Mean Score | Standard Deviation | Possible Range | Actual Range |
|---|---|---|---|---|
| Reading Time | 12.76[a] | 4.95 | 0-inf. | 3.82-33.52 |
| Lookbacks | .36 | .72 | 0-3 | 0-3 |
| Error Detection | 1.75 | 1.17 | 0-3 | 0-3 |
| Question Answering | 5.03 | 1.00 | 0-6 | 2-6 |
| Writing Performance | 5.63 | 2.45 | 0-12 | 0-12 |

[a]three paragraphs per cell

Because many students also failed to identify inconsistent sentences contained in comparison-contrast text, a similar negatively skewed distribution pattern was observed for error detection for the inconsistent comparison-contrast condition. However, students were better able to identify inconsistent sentences contained in sequence text as indicated by the essentially normal distribution of scores for inconsistent sequence conditions. The distribution of scores for identification of consistent sentences for both text types was positively skewed. This pattern revealed a ceiling effect that

probably occurred because of a response bias in which students tended to identify sentences in all paragraphs as consistent.

Similarly, the distribution of scores for the ability to answer questions was positively skewed, particularly for consistent comparison-contrast and inconsistent sequence conditions. The ceiling effect was obtained because students were able to correctly answer most comprehension questions.

Finally, an examination of the distribution pattern for writing performance scores revealed a generally normal distribution pattern for both comparison-contrast and sequence text types.

In summary, the scores for reading times, writing performance, and error detection for the inconsistent sequence condition generally followed a normal distribution pattern. However, scores for lookbacks, question answering, and error detection under the remaining three conditions were not evenly distributed. These distribution patterns must be considered in the analysis and interpretation of the data for this study.

Prior Knowledge and Task Performance

The second purpose of the preliminary analysis was to examine the possible effects of prior knowledge on task performance. This analysis was conducted in response to important research findings which indicate that topic knowledge influences reading comprehension and writing performance (Anderson, 1984). To accomplish this purpose, Pearson product moment correlations were calculated for student ratings on the Topic Familiarity Scale for each paragraph and

each dependent measure for each paragraph. The rationale for this procedure was that higher correlations among variables would provide evidence of the systematic influence of prior knowledge on task performance. The resulting correlation coefficients are reported in Table 6.

Table 6

Correlation Coefficients for Familiarity Ratings and Dependent Measures for Each Paragraph

| Paragraphs | Dependent Measure | | | |
|---|---|---|---|---|
| Reading | Reading Time | Lookbacks | Error Detection | Question Answering |
| Lions and Cats | -.05 | .06 | -.16 | .03 |
| Wolves and Dogs | .24 | .00 | .12 | -.03 |
| Winter and Summer | .01 | -.23 | -.21 | -.01 |
| Frogs and Toads | .17 | -.21 | -.17 | -.13 |
| Whales and People | .10 | -.05 | -.35* | -.02 |
| Ships and Planes | -.17 | .15 | .14 | .28 |
| Treating Cuts | .00 | -.28 | -.25 | -.07 |
| Restaurant | .05 | -.21 | -.25 | -.10 |
| Planting Crops | -.17 | .08 | -.17 | -.13 |
| Painting Wood | -.04 | -.16 | -.13 | -.04 |
| Growth of Butterfly | .25 | -.02 | -.22 | -.06 |
| Riding Bus | -.04 | -.12 | .13 | .13 |

| Writing | Writing Score |
|---|---|
| Forests and Deserts | .07 |
| Plants and Animals | -.04 |
| Moon and Sun | .21 |
| Making a Sandwich | -.01 |
| Buying Food | .20 |
| Washing Clothes | .04 |

*$p < .05$

Of the 54 correlation coefficients calculated, only the correlation between the familiarity rating and the ability to detect inconsistencies for the comparison-contrast paragraph Whales and People reached statistical significance ($r = -.35$, $p < .02$). This correlation indicated that as students judged themselves to be more familiar with the topic of this paragraph, their ability to accurately identify the paragraph as containing no inconsistent sentences decreased. This result was contrary to expectations that increased familiarity would lead to improved performance.

There are several possible explanations for the unexpected finding that familiarity ratings did not significantly correlate with student performance. One explanation is that scores for several of the reading measures failed to meet the underlying assumption that variables included in the correlations are normally distributed. Thus, it could not be expected that significant correlations would be obtained. Second, the low correlations for familiarity ratings and reading time scores may be an artifact of the reading time measure. As mentioned previously, observation of students' behavior and the wide range of reading times indicated that performance on this measure was confounded by time spent in non-reading behavior. Finally, the weak correlations may indicate that the Familiarity Scale did not adequately tap students' understanding of the topics. This interpretation is consistent with Bransford's (1984) notion that there are many levels at which students may lack the background knowledge necessary to understand text.

In summary, the number of low correlation coefficients obtained in this analysis indicated prior knowledge, at least as measured by the Familiarity Scale, was not an accurate predictor of students' performance on the dependent variables. Based on the number of low correlations among variables, the use of familiarity scores in any further analysis of performance on the dependent variables was not warranted.

## Analysis of the Data Concerning Each Hypothesis

### Analysis of Hypothesis 1

Hypothesis 1 stated that adolescents with learning disabilities will perform similarly to younger students, but less well than their normally achieving peers, in their use of text structure strategy in reading. An analysis was conducted to determine whether the four reading measures should be included in a single multivariate analysis of variance (MANOVA) or whether each measure should be considered separately using individual analysis of variance (ANOVA) procedures.

Pearson product moment correlations were calculated for the four reading measures (reading time, lookbacks, error detection, and question answering) across the four conditions related to text and consistency (inconsistent sequence, consistent sequence, inconsistent comparison-contrast, and consistent comparison-contrast). Two factors were considered in an attempt to predict the extent and direction of the correlations between reading measures for the various conditions. First, although the four variables were related to reading, they were selected in order to assess different aspects

of the reading process. Thus, it was not necessarily expected that the measures would be strongly correlated. The variables of reading time, lookbacks, and error detection were all indirect measures of sensitivity to text structure. As discussed in previous chapters, reading time and lookbacks were on-line measures of reading in which use of strategies to resolve inconsistencies in text could be observed as they occurred. These strategies could be implemented without conscious awareness on the part of the reader. Error detection, on the other hand, was a measure of the ability to identify inconsistencies when cued that inconsistencies might be present. This task required a conscious attempt to identify inconsistencies and occurred after, not during, the paragraph reading. Finally, question answering provided the only direct measure of reading comprehension included in this study. This task involved answering multiple-choice questions after reading the paragraphs.

A second factor considered in predicting intercorrelations between measures concerned how the variables were expected to interact with the conditions. For all of the dependent variables, it was the differential performance in the presence or absence of a text structure inconsistency which provided evidence of text structure awareness; that is, students who were aware of text structure were expected to read more slowly, use more lookbacks, be able to identify inconsistencies, and experience greater difficulty answering comprehension questions when they encountered text containing a text

structure inconsistency than when they encountered consistent text. Consequently, under inconsistent conditions, a strong positive correlation between reading time and use of lookbacks was expected; that is, when inconsistencies were encountered, students sensitive to text structure were expected to extend their reading time and use more lookbacks in an effort to resolve the difficulty. It also was predicted that reading time and lookbacks would show a positive correlation with error detection since readers aware of text structure would be likely to identify more inconsistencies than those unaware of text structure. Conversely, student performance on question answering was expected to decline when they encountered text inconsistencies; that is, awareness of inconsistencies would result in a disruption to comprehension manifested by reduced accuracy in answering comprehension questions. Consequently, it was predicted that question answering would be negatively correlated with the other three reading variables under inconsistent conditions.

For consistent conditions, the expected direction of the correlations was somewhat different. A positive correlation between reading time and lookbacks was predicted since reading time and lookbacks would likely decrease when there were no disruptions to reading comprehension. Unlike the inconsistent condition, error detection was expected to be negatively correlated with reading time and lookbacks; that is, students sensitive to text structure would show increased ability to identify paragraphs containing no inconsistencies while reading time and use of lookbacks would

decrease. Similarly, it was expected that question answering would be negatively correlated with reading time and lookbacks since ability to answer questions should improve when inconsistencies are eliminated. Finally, it was predicted that question answering would be positively correlated with error detection since responses to questions would be expected to improve when there were no inconsistencies and students were expected to state that paragraphs contained no inconsistencies as a kind of default strategy.

The correlation coefficients for the four reading measures were calculated for adolescents with learning disabilities and are reported in Table 7. Examination of the correlations according to the interpretation provided previously revealed only three of the correlations to be significant; of these, only one correlation was in the predicted direction. As expected, there was a positive correlation between reading time and lookbacks for consistent sequence text ($r = .63$, $p < .01$). Contrary to expectations, there was a positive correlation between question answering and reading time for consistent sequence text ($r = .58$, $p < .02$). None of the remaining 22 correlation coefficients were statistically significant. A possible explanation for the unexpected direction of some correlations and the weak correlations between most measures may be the failure of lookbacks, error detection, and question answering to meet the underlying assumption of normal distribution.

Table 8 provides the correlation coefficients for the reading measures for the fourth grade students. Results revealed that only

one correlation reached statistical significance. As predicted, error detection and question answering for consistent comparison-contrast text were positively correlated ($r = .52$, $p < .04$). This finding indicates that as the ability to identify consistent comparison-contrast text increased, accuracy in responding to comprehension questions improved.

The correlation coefficients for the reading measures for regular education adolescents are presented in Table 9. Examination of these correlations revealed three statistically significant correlations in the predicted direction. First, reading time and lookbacks were positively correlated for consistent sequence ($r = .64$, $p = .01$) and consistent comparison-contrast ($r = .64$, $p = .01$) paragraphs. These correlations indicate that as reading time decreased, use of lookbacks also decreased for both types of consistent text. In addition, reading time and error detection were positively correlated ($r = .63$, $p < .01$) for inconsistent comparison-contrast text; thus, as reading time increased, the ability to detect inconsistent sentences in comparison-contrast also improved. No other correlations reached statistical significance.

Based on the correlations calculated between reading variables for the three groups, it appeared that the number of significant correlations among dependent variables was not sufficient to warrant use of the MANOVA procedure. As mentioned previously, the lack of significant correlations may be attributed, at least in part, to the unusual distributions of some of the variables. Because of the low

Table 7

Correlation Coefficients for Dependent Reading Measures for Adolescents with Learning Disabilities (n = 15)

| Consistency | | Text Type | | | | | |
|---|---|---|---|---|---|---|---|
| | | Comparison-Contrast | | | Sequence | | |
| | | RT[a] | LB[b] | ED[c] | RT | LB | ED |
| Consistent | LB | .24 | | | .63* | | |
| | ED | -.43 | .01 | | -.18 | .13 | |
| | QA[d] | .32 | .31 | .02 | .58* | .36 | -.11 |
| | | RT | LB | ED | RT | LB | ED |
| Inconsistent | LB | .48 | | | .15 | | |
| | ED | .16 | .14 | | .19 | .23 | |
| | QA | .44 | .07 | .13 | .27 | .02 | -.05 |

[a]Reading time [b]Lookbacks [c]Error detection [d]Question answering

*$p < .05$

Table 8

Correlation Coefficients for Dependent Reading Measures for Fourth Graders (n = 15)

| Consistency | | Text Type | | | | | |
|---|---|---|---|---|---|---|---|
| | | Comparison-Contrast | | | Sequence | | |
| | | RT[a] | LB[b] | ED[c] | RT | LB | ED |
| Consistent | LB | -.12 | | | -.17 | | |
| | ED | -.40 | .40 | | .03 | .24 | |
| | QA[d] | -.08 | .36 | .52* | .16 | -.30 | .33 |
| | | RT | LB | ED | RT | LB | ED |
| Inconsistent | LB | -.21 | | | .12 | | |
| | ED | .16 | .21 | | -.05 | .13 | |
| | QA | -.23 | .29 | .51 | -.22 | .32 | .14 |

[a]Reading time [b]Lookbacks [c]Error detection [d]Question answering

*$p < .05$

Table 9

Correlation Coefficients for Dependent Reading Measures for Normally Achieving Adolescents (n = 15)

| Consistency | | Text Type | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Comparison-Contrast | | | | Sequence | | |
| | | RT[a] | LB[b] | ED[c] | | RT | LB | ED |
| Consistent | LB | .64* | | | LB | .64* | | |
| | ED | -.05 | -.23 | | ED | .27 | .19 | |
| | QA[d] | -.38 | -.13 | .05 | QA | .03 | .30 | -.10 |
| | | RT | LB | ED | | RT | LB | ED |
| Inconsistent | LB | .16 | | | LB | .08 | | |
| | ED | .64* | .32 | | ED | -.08 | .10 | |
| | QA | -.18 | .41 | -.04 | QA | .35 | .30 | .31 |

[a]Reading time [b]Lookbacks [c]Error detection [d]Question answering

*$p < .05$

correlations, it was decided that the appropriate analysis would be the application of individual analysis of variance procedures for each dependent measure. It is important to note that according to Glass and Stanley (1970) and Kirk (1968), the analysis of variance procedure remains robust even when performed on dependent variables which are not normally distributed.

Each variable concerning text comprehension was analyzed using a 3 (group: learning disabled adolescents, regular education fourth graders, regular education adolescents) X 2 (text: sequence, comparison-contrast) X 2 (consistency: inconsistent, consistent) repeated measures analysis of variance. Group was the between-subjects factor and text and consistency were within-subjects factors. When results of the ANOVA procedure yielded significant differences requiring a post hoc analysis, tests of simple effects (Dixon, 1983) and the Tukey (Kirk, 1968) multiple comparison procedure was used. An alpha level of .05 was used as the level of statistical significance for each analysis.

Reading Time. The first analysis was conducted on reading time for the fourth sentence of the paragraphs. Results of the analysis of variance revealed statistically significant differences between reading times for group, $F$ (2,42) = 10.47, $p < .0002$. No significant effects for the type of text in which the sentence was embedded or the consistency of the sentence with the text structure of the remainder of the paragraph were found. In addition, no interactions

reached statistical significance. Means and standard deviations used in the analysis are reported in Table 10.

Table 10

Means and Standard Deviations (in parentheses) for Fourth Sentence Reading Times

| Group | Comparison-Contrast | | Sequence | |
|---|---|---|---|---|
| | Inconsistent | Consistent | Inconsistent | Consistent |
| Learning Disabled (n=15) | 13.82[a] (5.75) | 12.58 (5.22) | 14.38 (5.22) | 13.51 (4.82) |
| Fourth Grade (n=15) | 13.86 (5.22) | 14.74 (4.82) | 15.49 (3.33) | 16.54 (5.98) |
| Adolescents (n=15) | 9.92 (4.14) | 9.22 (2.90) | 9.92 (3.27) | 9.10 (2.64) |

[a]seconds

Tukey's multiple comparison procedure was used to determine the source of group differences. Results revealed that regular education adolescents read the fourth sentences significantly faster (M = 9.54, SD = 3.23) than did the adolescents with learning disabilities (M = 13.57, SD = 4.77) or the fourth grade students (M = 15.16, SD 4.91). No other significant differences were found between group means.

Although the original analysis involved only fourth sentence reading times, a subsequent analysis was conducted for combined fourth and fifth sentence reading times. The rationale for this analysis was that some subjects might not become aware of an

inconsistent fourth sentence until they encountered the fifth sentence; that is, whereas some subjects might be immediately aware of the discrepancy at the level of the fourth sentence, other subjects might become cognizant of the inconsistency only when they read on and found that the structure both preceding and following the inconsistent sentence was different. Although this analysis is of interest, it should be noted that fifth sentences were not controlled in this study; that is, there was no attempt to ensure that fifth sentences were of similar length or complexity across text type or consistency. Consequently, results of this analysis must be interpreted with caution.

Results of the ANOVA for combined fourth and fifth sentence reading times revealed statistically significant effects for group, $F$ (2,42) = 10.22, $p < .0002$, and consistency, $F$ (1,42) = 13.25, $p < 0007$. No other significant main effects or interaction effects were found. Means and standard deviations used for the analysis are displayed in Table 11.

Use of the Tukey multiple comparison procedure to analyze differences between group means yielded findings similar to those for fourth sentence reading times. Results indicated that regular education adolescents read fourth and fifth sentences significantly more rapidly (M = 22.16, SD 7.30) than adolescents with learning disabilities (M = 31.66, SD 10.19) or fourth grade students (M = 33.38, SD = 9.30).

Main effects for consistency revealed that students spent significantly more time reading the fourth and fifth sentences of paragraphs containing inconsistencies (M = 30.51, SD = 9.94) than those without inconsistencies (M = 27.63, SD = 10.38).

Table 11

Means and Standard Deviations (in parentheses) for Combined Fourth and Fifth Sentence Reading Times

| Group | Comparison-Contrast | | Sequence | |
|---|---|---|---|---|
| | Inconsistent | Consistent | Inconsistent | Consistent |
| Learning Disabled (n=15) | 32.65[a] (10.47) | 28.87 (8.90) | 34.99 (11.42) | 30.13 (9.70) |
| Fourth Grade (n=15) | 33.14 (8.08) | 31.97 (8.43) | 34.64 (5.60) | 33.79 (13.90) |
| Adolescents (n=15) | 24.23 (9.57) | 21.60 (6.95) | 23.36 (7.12) | 19.42 (4.41) |

[a]seconds

Lookbacks. The use of lookbacks for fourth sentences was also analyzed. Results of the analysis of variance procedure revealed significant main effects for group, $F$ (2, 42) = 3.27, $p < .048$. No other significant main effects or interactions were found. Means and standard deviations used in this analysis are located in Table 12.

Although the analysis of variance revealed statistically significant differences for group, results of the Tukey analysis revealed no significant differences among group means. These findings may be explained by the fact that, when rounded off, the

$p$ value for group merely approaches the .05 alpha level of significance (i.e., it is equal to, but not less than, .05); thus, a more fine-grained analysis showed no significant differences between group means. However, examination of the mean scores indicates a trend in which regular education adolescents used more lookbacks (M = .65, SD = .92) than fourth graders (M = .25, SD = .54), and fourth graders used more lookbacks than adolescents with learning disabilities (M = .18, SD = .54).

Table 12

Means and Standard Deviations (in parentheses) for Fourth Sentence Lookbacks

| Group | Comparison-Contrast | | Sequence | |
|---|---|---|---|---|
| | Inconsistent | Consistent | Inconsistent | Consistent |
| Learning Disabled (n=15) | 0.13[a] (0.35) | 0.26 (0.70) | 0.13 (0.51) | 0.20 (0.56) |
| Fourth Grade (n=15) | 0.26 (0.59) | 0.33 (0.61) | 0.26 (0.59) | 0.13 (0.35) |
| Adolescents (n=15) | 0.66 (0.89) | 0.80 (0.86) | 0.60 (0.98) | 0.53 (0.99) |

[a]maximum score = 3

Lookbacks were further examined to identify the number and percentage of students who obtained each possible score. Since there were three paragraphs for each condition, the score for lookbacks used by each student ranged from 0 to 3. The information provided on the frequency tables indicated that many students in each group failed to use any lookbacks. In fact, the percentage of learning

disabled adolescents, fourth grade students, and regular education adolescents who failed to use any lookbacks was 88.5, 80, and 61.67, respectively. Conversely, only one student used three lookbacks and, this unexpectedly occurred under the consistent sequence text condition.

Based on the rationale used for analyzing combined fourth and fifth sentence reading times, use of lookbacks for combined fourth and fifth sentence lookbacks was also investigated. As mentioned in the section on reading time, it was hypothesized that some students might not become aware of an inconsistent fourth sentence until they encountered the fifth sentence. However, the lack of controls for the fifth sentence allows only a tentative interpretation of results of this analysis.

Results of the analysis of variance for fourth and fifth sentence lookbacks revealed statistically significant differences for group, $\underline{F}$ (2, 42) = 4.06, $\underline{p} < .024$. No other statistically significant main effects or interactions were found. Means and standard deviations used for the analysis of combined fourth and fifth sentence lookbacks are located in Table 13.

Results of the Tukey multiple comparison procedure revealed that regular education adolescents used more lookbacks (M = 1.38, SD = 1.48) than either fourth grade students (M = .2, SD = 1.04) or adolescents with learning disabilities (M = .36, SD = 88). These findings are consistent with the trend identified for use of fourth

sentence lookbacks. No other significant differences among group means were found.

Table 13

Means and Standard Deviations (in parentheses) for Combined Fourth and Fifth Sentence Lookbacks

| Group | Comparison-Contrast | | Sequence | |
|---|---|---|---|---|
| | Inconsistent | Consistent | Inconsistent | Consistent |
| Learning Disabled (n=15) | 0.40[a] (0.82) | 0.53 (1.18) | 0.26 (0.80) | 0.26 (0.70) |
| Fourth Grade (n=15) | 0.80 (1.37) | 0.60 (0.98) | 0.53 (0.99) | 0.53 (0.83) |
| Adolescents (n=15) | 1.46 (1.41) | 1.60 (1.45) | 1.33 (1.63) | 1.13 (1.55) |

[a]maximum score = 6

Examination of frequency scores showed that although use of lookbacks was greater than that observed for fourth sentence lookbacks only, a large percentage of the learning disabled and fourth grade groups still failed to use any lookbacks. In contrast, the number of regular education adolescents who used lookbacks greatly increased. The percentage of students who failed to use lookbacks was 81.7 for adolescents with learning disabilities, 70 for fourth graders, and 34.32 for regular education adolescents.

Error detection. Performance on error detection was measured by the ability to identify sentences which were inconsistent with the prevailing text structure of the paragraph. Results of the analysis

of variance for error detection revealed significant main effects for text, $\underline{F}$ (1,42) = 20.05, $\underline{p} < .0001$, and consistency, $\underline{F}$ (1,42), $\underline{p} < .0000$, but not for group. In addition, a significant text x consistency interaction, $\underline{F}$ (1.42) = 32.07, $\underline{p} < .0000$, was found. Table 14 presents the means and standard deviations used in the analysis.

Table 14

Means and Standard Deviations (in parentheses) for Error Detection

| Group | Comparison-Contrast | | Sequence | |
|---|---|---|---|---|
| | Inconsistent | Consistent | Inconsistent | Consistent |
| Learning Disabled (n=15) | 0.33[a] (0.48) | 2.46 (0.74) | 1.13 (1.06) | 2.33 (0.97) |
| Fourth Grade (n=15) | 0.46 (0.63) | 2.66 (0.48) | 1.20 (1.08) | 2.73 (0.45) |
| Adolescents (n=15) | 0.66 (0.82) | 2.66 (0.72) | 1.66 (0.72) | 2.66 (0.62) |

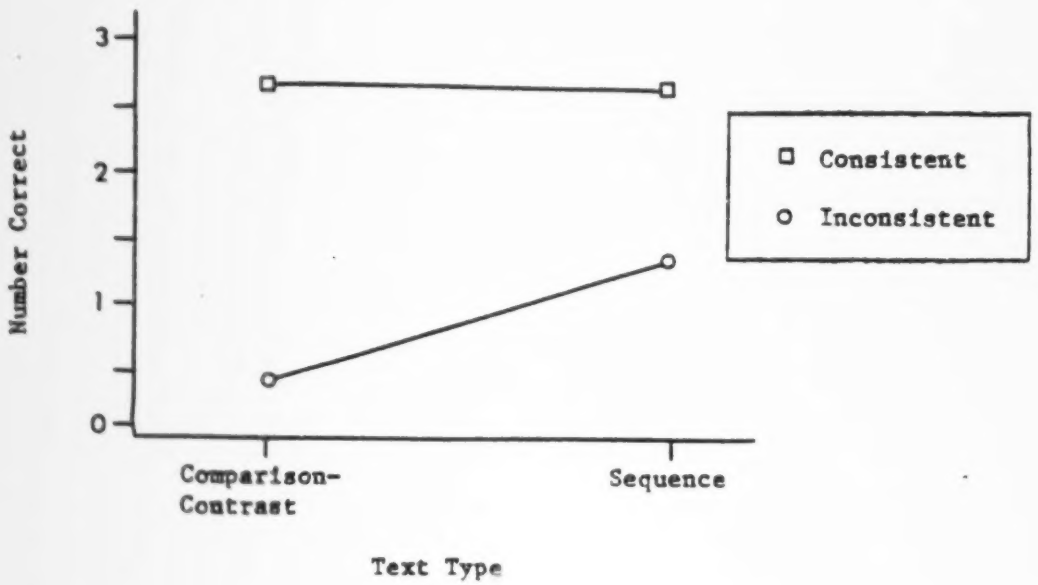
[a]maximum score = 3

The Tukey procedure was used to analyze the interaction of text and consistency. Figure 2 depicts the data for this interaction. Results of the analysis revealed that subjects were significantly better able to identify inconsistent sentences for sequence text (M = 1.33, SD = .97) than for comparison-contrast text (M = .48, SD = .66). In addition, the analysis showed that students performed significantly better at identifying consistent sentences in sequence text (M=2.57, SD = .72) than inconsistent sentences in sequence text

(M = 1.33, SD = .97) . Similarly, students were significantly better able to identify consistent sentences (M = 2.60, SD = .65) than inconsistent sentences (M = .48, SD = .66) for comparison-contrast text. However, the identification of consistent sentences was similar for both sequence (M = 2.57, SD = .72) and comparison-contrast (M = 2.60, SD = .65) text. It should be noted that the scores for consistent sentences were probably artificially inflated due to the tendency for students to state that sentences were consistent for all paragraphs.

Figure 2

Interaction of Text and Inconsistency for Error Detection




An examination of the frequency scores shows that although students performed relatively poorly in identifiying inconsistent

sentences across text types, performance was even worse for comparison-contrast text. In fact, 58% of the students failed to detect any inconsistent sentences embedded in comparison-contrast text, whereas 22% of the students failed to identify any inconsistent sentences inserted in sequence text. None of the students identified all three inconsistencies located in comparison-contrast text, and only 13% of the subjects correctly identified all three inconsistencies embedded in sequence text.

In contrast, frequency scores showed that the consistent sentences in both comparison-contrast and sequence text were identified by nearly 70% of the students, and only one subject failed to correctly identify any consistent sentence found in sequence text. No subject failed to correctly identify at least one consistent sentence in comparison-contrast text. As mentioned previously, these findings probably reflect a response bias in which students typically responded that all sentences belonged in the paragraphs.

Question answering. Responses to multiple-choice comprehension questions for each paragraph were also analyzed. Results of the analysis of variance procedure for answering questions revealed no statistically significant main effects. However, interaction effects for text x group, $F$ (2,42) = 3.86, $p < .03$, and text x consistency, $F$ (1,42) = 14.49, $p < .0005$, were found. The means and standard deviations used in this analysis are located in Table 15.

Table 15

Means and Standard Deviations (in parentheses) for Question Answering

| Group | Comparison-Contrast | | Sequence | |
|---|---|---|---|---|
| | Inconsistent | Consistent | Inconsistent | Consistent |
| Learning Disabled (n=15) | 4.80[a] (1.14) | 5.06 (1.22) | 4.93 (1.22) | 4.80 (1.26) |
| Fourth Grade (n=15) | 4.86 (0.63) | 5.53 (0.74) | 4.60 (0.98) | 4.33 (1.11) |
| Adolescents (n=15) | 4.93 (0.70) | 5.66 (0.61) | 5.60 (0.63) | 5.26 (0.70) |

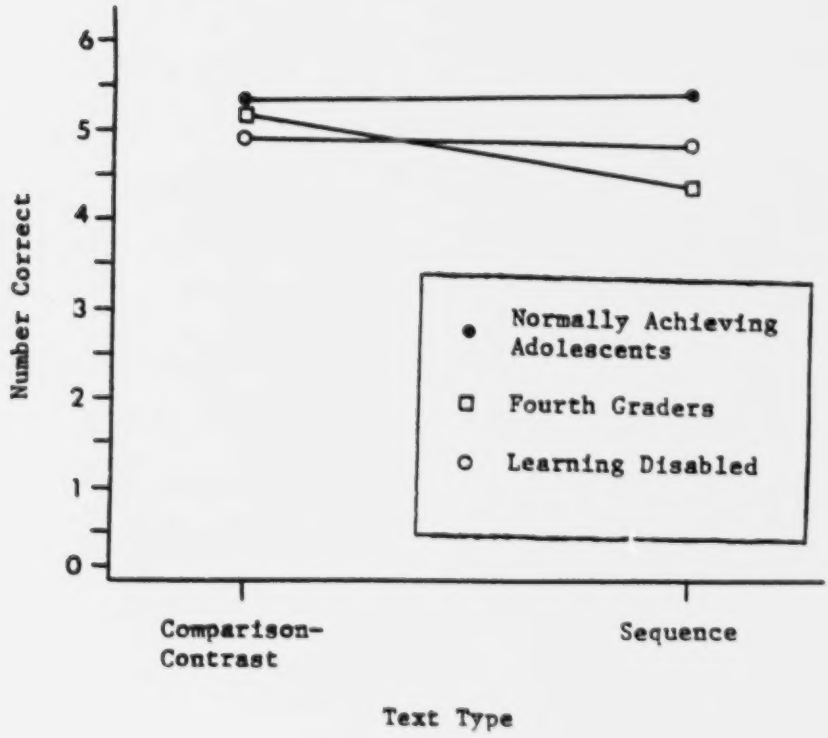
[a] maximum score = 6

To determine the source of the differences for the text X group interaction, the Tukey procedure was used. The data for this interaction are displayed in Figure 3. Results of the Tukey analysis revealed that fourth grade students were significantly better able to answer questions for comparison-contrast text (M = 5.2, SD = .76) than questions for sequence text (M = 4.46, SD 1.04), $\underline{F}$ (1,42) = 10.08, $\underline{p} < .0003$. Neither group of adolescents displayed significant differences according to text type. The analysis also revealed that fourth graders are significantly poorer at answering questions for sequence text (M = 4.46, SD = .1.04) than regular education adolescents (M = 5.43, SD = .67). No significant differences were found between learning disabled adolescents and the other two groups in their ability to answer sequence text questions. No significant

differences between groups for the ability to answer questions related to comparison-contrast text were found.

Figure 3

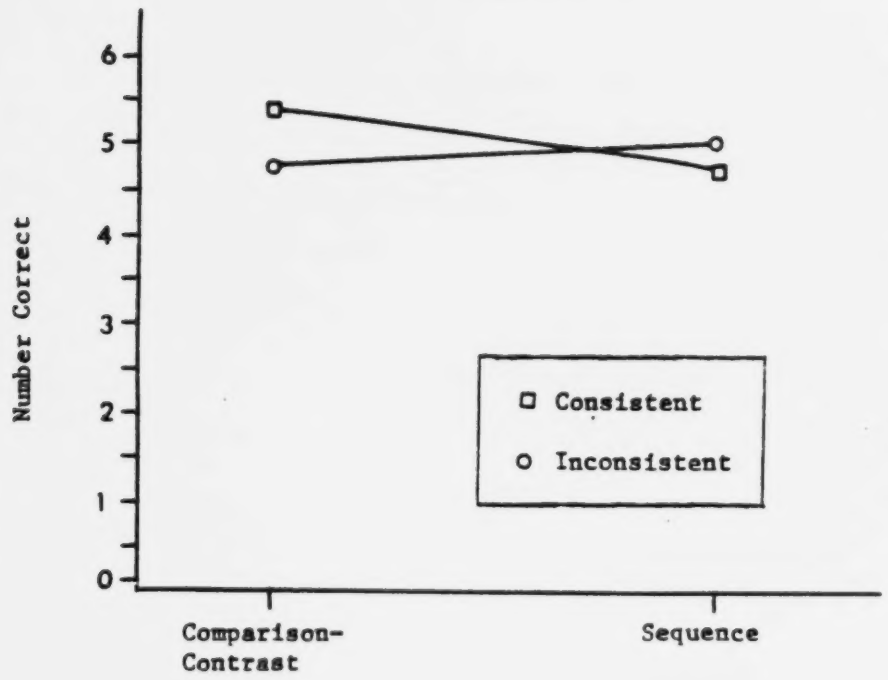
Interaction of Text and Group for Question Answering




Tukey's procedure was also used to examine the text x consistency interaction. Figure 4 depicts the data for this interaction. The analysis revealed that subjects were better able to answer questions for consistent comparison-contrast paragraphs ($M = 5.42$, $SD = .92$) than those for inconsistent comparison-contrast text ($M = 4.87$, $SD = .84$) or for consistent sequence paragraphs ($M = 4.80$, $SD = 1.10$).

Figure 4

Text by Consistency Interaction for Question Answering




Examination of scores using the frequency table indicates that students generally performed well on this task. In fact, 39% of the students achieved perfect scores and fully 73% of the students missed no more than one question.

Summary. Analyses of the four reading variables provides support only for the portion of the first hypothesis which states that adolescents with learning disabilities and fourth grade students will perform similarly in their use of text structure strategy in reading. The portion of the hypothesis which states that adolescents

with learning disabilities will not perform as well as their peers in their use of text structure strategy in reading was not upheld since there were no significant group by consistency interactions involving learning disabled adolescents for any variable.

Analysis of the data for reading time and lookbacks indicated that normally achieving adolescents read faster and used more lookbacks in general than did learning disabled adolescents or fourth grade students. However, the lack of a group by consistency interaction provided no evidence that the differential use of reading time and lookbacks by normally achieving adolescents was a function of differences in text structure sensitivity. Analysis of fourth and fifth sentence reading times revealed that all groups were affected by inconsistencies contained in both sequence and comparison-contrast text. However, performance on the error detection task revealed that all groups were better able to identify inconsistencies in sequence text than in comparison-contrast text, although no group performed well on this task for either text type. Although analysis of question answering scores revealed significant performance differences between fourth graders and normally achieving adolescents for sequence text, the performance of learning disabled adolescents was not significantly different from either group. All groups were affected by the inconsistencies in comparison-contrast text as indicated by the superior performance on consistent comparison-contrast questions compared to inconsistent comparison-contrast questions. However, the fact that students also performed better on

consistent comparison-contrast questions than on consistent sequence questions suggests that the superior performance for consistent comparison-contrast text may be an artifact of the questions; i.e., the questions for consistent comparison-contrast text may be less difficult than the questions for the other conditions.

Analysis of Hypothesis 2

Hypothesis 2 stated that adolescents with learning disabilities will perform similarly to younger students, but less well than their normally achieving peers, in their use of text structure strategy in writing.

Use of text structure strategy in writing was evaluated according to scores obtained on a paragraph completion task. Scores were analyzed using a 3 (group: learning disabled adolescents, fourth graders, regular education adolescents) x 2 (text: sequence, comparison-contrast) analysis of variance with repeated measures on the text factor. Results of the analysis revealed significant main effects for group, $F$ (2,42) = 4.03, $p < .025$, and text, $F$ (1,42) = 19, $p < .0001$. There were no interaction effects. Means and standard deviations used in this analysis are presented in Table 16.

The Tukey multiple comparison procedure was used to identify the source of significant group differences. Results of the analysis indicated that regular education adolescents were significantly better at completing paragraphs (M = 6.6, SD 2.06) than learning disabled adolescents (M = 4.73, SD = 1.95). The performance of fourth grade students (M = 5.53, SD 2.96) did not differ

significantly from that of either adolescent group. It is worth noting, however, that none of the groups performed well on this task. Students with learning disabilities, fourth grade students, and regular education adolescents achieved only 39, 46, and 55 percent of the available points on the writing task, respectively.

Table 16

Means and Standard Deviations (in parentheses) for Paragraph Completion

| Group | Comparison-Contrast | Sequence |
|---|---|---|
| Learning Disabled (n=15) | 3.93[a] (1.33) | 5.53 (2.58) |
| Fourth Grade (n=15) | 4.40 (2.47) | 6.66 (3.45) |
| Adolescents (n=15) | 5.40 (1.88) | 7.80 (2.24) |

[a]maximum score = 12

Examination of text means revealed that subjects performed better in completing sequence paragraphs (M = 6.66, SD = 2.76) than in completing comparison-contrast paragraphs (M = 4.57, SD = 1.89). Analysis of mean scores revealed that students averaged only 55% of the possible total points for sequence paragraphs and 38% of the possible total points for comparison-contrast paragraphs.

In summary, these results provide support for the hypothesis concerning the writing performance of adolescents with learning

disabilities. As expected, learning disabled adolescents performed less well than their normally achieving peers and similarly to fourth grade students in completing written paragraphs. In addition, all groups performed better on sequence text structure than comparison-contrast text structure. These findings indicate that although learning disabled students were less able to use the structure of text as an aid to writing, the differential sensitivity to the two types of text structure was similar for all three groups; that is, all groups were better able to use sequence than comparison-contrast text structure.

Analysis of Hypothesis 3

Hypothesis 3 stated that adolescents with learning disabilities and younger students will show a weaker relationship in their use of text structure strategy than their normally achieving peers. To test this hypothesis, Pearson product moment correlations were performed on the reading and writing measures for each condition by group. Table 17 presents the correlation coefficients used in this analysis.

Interpretation of these correlations requires clarification concerning what kinds of correlations were viewed as support for a relationship between reading and writing measures. As mentioned previously, the extent and direction of correlations were expected to differ according to the dependent measures and conditions. First, it was assumed that evidence of a relationship between reading and writing under inconsistent reading conditions would be shown when writing scores showed a positive correlation with reading times,

Table 17

Correlation Coefficients for Reading and Writing Measures (N = 15)

| | Learning Disabled | | Fourth Graders | | Normal Adolescents | |
|---|---|---|---|---|---|---|
| Reading Measures | Writing Measure | | | | | |
| | Seq[a] | CC[b] | Seq | CC | Seq | CC |
| Reading Time | | | | | | |
| SI[c] | -.49 | -.02 | -.22 | -.04 | .31 | -.12 |
| SC[d] | -.54* | -.10 | -.50 | -.25 | .38 | -.52* |
| CCI[e] | -.39 | -.04 | -.34 | .14 | .12 | -.28 |
| CCC[f] | -.46 | -.07 | -.19 | -.11 | -.20 | -.27 |
| Lookbacks | | | | | | |
| SI | -.06 | -.19 | .01 | .55* | .12 | .25 |
| SC | -.57* | .11 | .04 | -.31 | .41 | -.01 |
| CCI | -.15 | .17 | -.02 | .75* | -.04 | .21 |
| CCC | -.01 | .17 | .02 | .09 | -.21 | .28 |
| Error detection | | | | | | |
| SI | -.02 | .01 | .42 | .26 | -.18 | .16 |
| SC | .49 | -.09 | -.06 | -.21 | .72* | -.06 |
| CCI | -.21 | .04 | .49 | .51 | .00 | .00 |
| CCC | .79* | .11 | .06 | .24 | .48 | -.42 |
| Question Answering | | | | | | |
| SI | -.01 | -.05 | .06 | .33 | .39 | -.03 |
| SC | -.38 | .20 | -.04 | -.26 | -.14 | .08 |
| CCI | .04 | .27 | .40 | .31 | .40 | .30 |
| CCC | -.22 | -.08 | -.18 | .22 | .72 | .06 |

[a]Sequence [b]Comparison-contrast [c]Inconsistent Sequence
[d]Consistent Sequence [e]Inconsistent Comparison-contrast [f]Consistent Comparison-contrast

* $p < .05$

lookbacks, and error detection. That is, as scores on the writing task increased, sensitivity to text structure inconsistencies were also expected to increase as evidenced by longer reading time, greater use of lookbacks, and greater ability to identify inconsistent sentences. However, it was hypothesized that a relationship between writing and question answering for inconsistent paragraphs was best shown by a negative correlation between these two measures; that is, as writing scores increased, sensitivity to text structure inconsistencies for answering questions would be manifested by increased disruption to the comprehension process as evidenced by poorer performance on question answering.

The relationships between reading and writing performance were expected to be somewhat different under consistent conditions. For example, it was predicted that evidence of a relationship between writing and reading times and lookbacks under consistent conditions would be shown by a negative correlation. That is, as scores on the writing tasks increased, it was predicted that reading times and lookbacks for consistent paragraphs would decrease because students would have no need to resolve a text structure descrepancy. Conversely, writing task performance and the reading measures of error detection and question answering for consistent paragraphs were expected to show a positive correlation. As writing performance increased, the ability to identify sentences as being consistent and the ability to correctly answer questions in paragraphs which contain no text structure inconsistency to disrupt comprehension would

increase. Finally, it was expected that correlations between writing scores and reading scores representing the same text type would demonstrate stronger correlation in the desired direction than across text types.

Examination of the correlation coefficients for learning disabled adolescents revealed only three statistically significant correlations. First, the ability to identify consistencies in comparison-contrast text and to write sequence text was highly correlated ($r = .79$, $p < .0005$); that is, as students improved in their ability to correctly identify comparison-contrast text which contained no inconsistencies, writing scores for sequence paragraphs improved. In addition, performance on the sequence writing task was negatively correlated with reading time ($r = -.54$, $p < .03$) and lookbacks ($r = -.57$, $p < .03$) for consistent sequence paragraphs. These correlations indicate that as sequence writing scores improved, reading time and use of lookbacks decreased for sequence text containing no inconsistencies. These three correlations were all in the predicted direction.

For fourth grade students, only two correlations reached statistical significance. Performance on the comparison-contrast writing task was positively correlated with use of lookbacks for inconsistent sequence text ($r = .55$, $p < .03$) and inconsistent comparison-contrast text ($r = .75$, $p < .001$). These findings indicate that as writing scores for comparison-contrast text increased, the use of lookbacks when encountering inconsistencies

increased across both text types. Both of these correlations were in the predicted direction.

Similar to the performance of fourth grade students, only three correlations were statistically significant in the expected direction for regular education adolescents. Performance on writing sequence paragraphs was positively correlated with detection of consistencies in sequence text ($r = .72$, $p < .002$) and answering questions for consistent comparison-contrast text ($r = .72$, $p < .002$). Thus, improved writing scores for sequence paragraphs were accompanied by improved ability to identify sequence text containing no inconsistencies and by increased accuracy in answering questions for consistent comparison-contrast text. In addition, the correlation between writing performance on the comparison-contrast paragraphs was significantly negatively correlated with reading time for consistent sequence paragraphs ($r = -.52$, $p < .047$). This correlation indicates that higher sequence writing scores were associated with reduced reading time for consistent sentences in sequence text.

In summary, the third hypothesis that learning disabled adolescents and younger students would show a weaker relationship between their use of text structure in reading and writing than their peers was not supported by the correlation coefficients calculated for the reading and writing measures. In fact, the correlations showed a minimal relationship between text structure use in reading and writing for all groups. As mentioned in previous discussions of correlations, the skewed distributions for performance on lookbacks,

error detection, and question answering may explain the lack of correlations between these variables and other normally distributed variables. However, distribution of scores does not account for the weak correlations between reading time and writing performance. It is suspected that the failure of reading time and writing performance to correlate is an artifact of the reading time measure. As mentioned in the section concerning preliminary analysis, observation of students' behavior during administration of the experimental task indicated that this measure was confounded by time spent in searching for keys to press and off-task behavior, such as looking around the room. Consequently, reading time could not be expected to correlate with writing performance since reading time is not an accurate measure of text structure sensitivity.

## Summary

The analyses performed on the reading variables revealed that learning disabled adolescents performed similarly to fourth graders, but not poorer than their normally achieving peers, in their use of text structure strategy during reading. All groups 1) demonstrated sensitivity to text inconsistencies during reading, 2) were better able to identify inconsistent sentences embedded in sequence text than in comparison-contrast text, and 3) experienced greater difficulty answering questions for inconsistent than consistent comparison-contrast text. In contrast and as predicted, learning disabled adolescents performed less well than their peers and similarly to fourth graders in their use of text structure during

writing. All groups performed better at completing paragraphs for sequence text structure than for comparison-contrast text structure. Finally, the prediction that learning disabled adolescents and fourth graders would show a weaker relationship between text structure use in reading and writing than normally achieving adolescents was not upheld. In fact, few significant correlations were found among variables for any group.

# CHAPTER 4

# DISCUSSION

The purpose of this chapter is to discuss and interpret the results of this investigation. The chapter has been divided into three sections. The first section provides a summary and interpretation of the findings relative to the three hypotheses. The second section presents the limitations of the study. In the last section, the practical implications of the research findings are discussed and suggestions for future research are made.

## Interpretation of Research Results

This portion of the discussion concerns the interpretation of the findings reported in the Results chapter. Each hypothesis will be listed followed by an interpretation of the analysis.

### Interpretation of Analysis for Hypothesis 1

Hypothesis 1 stated that adolescents wih learning disabilities would perform much like younger students and less well than their normally achieving peers in use of text structure strategy in reading. Analysis of the data for the four dependent measures obtained in the context of an error detection paradigm failed to support the hypothesis that adolescents with learning disabilities do not use text structure strategy in reading as effectively as their normally achieving peers. Results indicated that both learning disabled adolescents and their peers performed similarly to younger students in their use of text structure strategy. These findings are consistent with those of Berkowitz and Taylor (1981),

Slater et al. (1985), and Worden et al. (1982), but contradict those of other studies which show that students with learning disabilities (e.g., Hansen, 1978; Englert & Thomas, in press; Jenkins et al., 1984) and younger or poorer readers (e.g., Englert et al., 1984; Hiebert et al., 1983) failed to use text structure strategy during reading as effectively as skilled readers.

In this study, the patterns of reading performance were quite similar for all groups. The following includes a discussion of these patterns.

Pattern 1. Students in all groups demonstrated some awareness of text structure inconsistencies during uncued reading conditions. Although students took longer to read inconsistent sentences or the sentence following the inconsistent sentences than they did to read consistent sentences, no differences were found in the use of lookbacks for inconsistent and consistent sentences.

Metacognitive theory provides a context for interpreting this finding. As mentioned previously, regulation of cognition is an important aspect of metacognition in reading. It requires that readers possess knowledge of strategies which serve to increase reading comprehension, recognize obstacles to reading comprehension as they occur, and select and implement one or more "fix-up" strategies to correct the problem and accomplish the reading task in the most efficient manner. According to Brown (1980), regulation of cognition typically is often an unconscious process which proceeds

automatically until an obstacle is encountered which disrupts comprehension.

The theory of regulation of cognition can be applied to use of text structure strategy. Students who use text structure during reading select from memory the text structure that best matches the text. They then use this structure as a framework for understanding and remembering what is read. In this study, students who used text structure selected the appropriate sequence or comparison-contrast text structure and implemented it automatically until they encountered a sentence which did not match the prevailing text structure. This sentence was viewed as an "obstacle" because it disrupted the pattern of text structure use. Students responded by implementing longer reading time as a technique for resolving the problem. In contrast, when these same sentences were embedded in paragraphs so that they were consistent with the paragraph text structure, text structure strategy use proceeded automatically as evidenced by the shorter reading times.

Interestingly, although students engaged in longer reading times when they encountered inconsistencies, they were not induced to implement the "fix up" strategy of lookbacks. Baker and Anderson (1982) found a similar pattern among college students who responded to text inconsistencies with increased reading time but who failed to look back to previous portions of the text. A similar finding was reported by August, Flavell, and Clift (1984) who found that students read longer when they encountered missing pages in text but failed to

look back to previous portions of the text. Similarly, Garner and Reis (1981) reported that junior high poor readers failed to use lookbacks to answer questions, even when they realized their inability to respond correctly.

There are at least three plausible explanations for students' failure to use lookbacks as a "fix-up" strategy. First, students in this study might have lacked knowledge of lookbacks as a fix-up strategy or might have lacked the ability to apply it effectively. This explanation is supported by research which suggests that appropriate use of the lookback strategy is developmentally acquired (Garner & Reis, 1981).

An alternative explanation is that students were not sufficiently motivated to use the more involved combination of reading time and lookbacks as fix-up strategies. Since the paragraphs were so simple that students performed quite well at question answering and since they knew they were not being graded, they may have made a decision not to look back to previous portions of the text.

A third explanation is that reading text sentence-by-sentence on the microcromputer may have discouraged students from using lookbacks which they might have used under normal reading conditions. For example, the selection of the "R" button in order to review text was more difficult and time consuming than spontanously looking back to previously read text as it appears on the printed page. Thus,

student performance on the microcomputer task may not accurately represent use of lookbacks during typical reading.

Pattern 2. Some students in all groups were able to identify text structure inconsistencies with some success when told that inconsistent sentences were present. In contrast to the finding that students were equally affected by sequence and comparison-contrast text structure inconsistencies during uncued reading conditions, students were better able to identify inconsistencies in sequence text than in comparison-contrast text when cued.

Both this pattern and the first pattern indicated that students used text structure as a reading strategy; however, they revealed different kinds of metacognitive skills. Whereas the first pattern revealed that students were affected by obstacles to comprehension, the second pattern showed that some students could identify the specific problem when cued. This is an important skill because the ability to apply appropriate fix-up strategies in response to an obstacle requires that the reader be able to identify the source of the problem (Danner, 1976).

The ability of students to identify some of the inconsistencies for both sequence and comparison-contrast text indicates some ability to identify specific obstacles to text structure use for both text types. However, the superior performance for identification of sequence inconsistencies suggests that students in all groups possessed a higher level of developmental awareness for sequence than comparison-contrast text structure. These results are consistent

with other error detection research which showed comparison-contrast text structure to be less salient than sequence text structure for young readers (Englert & Hiebert, 1984) and learning disabled readers (Englert & Thomas, in press), but contradicts other studies which show no differences for awareness of these two text types for adults (Hiebert et al., 1983) or children (Englert, Stewart, & Hiebert, 1984).

An examination of Meyer and Freedle's (1984) theory concerning the organizational components of text may provide an explanation for the superior performance on sequence text compared to comparison-contrast text on this task. Based on Meyer and Freedle's continuum of text structures, sequence text is a rather simple text type which involves the grouping of elements by association and time of occurrence. Further, sequence text tends to be more familiar to children because they are already well acquainted with the time-based sequence in stories and in their own life experiences. Comparison-contrast text, on the other hand, has a more complex organizational structure than sequence text. For comparison-contrast text, readers must keep two or more parallel topics or events in mind and, unlike sequence text, there is no logical analog in real-life experience to assist the writer in using this text structure. Consequently, students may have greater difficulty with the complexity and unfamiliar schema for organization which this text structure imposes.

Pattern 3. Students in all groups were better able to answer questions for consistent than inconsistent comparison-contrast paragraphs. However, they performed similarly in their ability to answer questions for consistent and inconsistent sequence text.

As mentioned previously, mature regulation of cognition requires that strategies are selected and implemented in order to achieve the task goal. Performance on question answering, paired with information concerning use of reading time and lookbacks, assessed readers' ability to select effective fix-up strategies in order to accomplish reading goals.

In this study, the stated goal of the reading task was to answer the comprehension questions. The strategies which could be applied and measured for the uncued reading task were longer reading time and lookbacks. Accuracy of responses to questions was used as a measure of the effectiveness of students' selection and use of these strategies. Recall that students used extended reading time, but not lookbacks, as a strategy for resolving text structure inconsistencies. The poorer performance on inconsistent compared to consistent comparison-contrast questions indicated that students did not select a strategy which was sufficient for accomplishing the stated goal for comparison-contrast text. Although longer reading time appeared sufficient to resolve comprehension obstacles for sequence text, perhaps the use of extended reading time combined with lookbacks should have been used for comparison-contrast text. In fact, research confirms that use of lookbacks after comprehension

questions are presented is an effective strategy for improving student performance (Alessi, Anderson, & Goetz, 1979). Although the task used in the research only permitted lookbacks before questions were presented, it is possible that use of lookbacks might have improved scores on comprehension questions under these conditions as well.

There are several explanations for students' failure to implement sufficient fix-up strategies for comparison-contrast text. Two of these (failure to master lookbacks as a fix-up strategy and lack of motivation) were discussed under Pattern 1. A third plausible explanation is that students were sufficiently unaware of the differential demands of sequence and comparison-contrast text structures that they did not anticipate the need to take more involved corrective action for the more complex comparison-contrast text than for sequence text. Results for the error detection task provide tentative support for this interpretation based on students' less developed sensitivity to comparison-contrast text than sequence text.

Interpretation of Analysis for Hypothesis 2

Hypothesis 2 stated that adolescents with learning disabilities would perform similarly to younger students and poorer than their normally achieving peers in use of text structure strategy during writing. As predicted, learning disabled adolescents did not perform as well as their normally achieving peers in their use of text structure strategy during the paragraph completion task. Instead,

they performed much like younger students of the same reading level. In addition, analysis of the writing protocols revealed that no group performed well on this task. These results are consistent with those obtained in other studies which show that, compared to skilled writers, younger or poorer writers (Englert et al., 1985; Hiebert et al., 1983) and writers with learning disabilities (Englert & Thomas, in press) are lacking in the use of text structure organization during writing. These studies also reported that no group performed well on paragraph completion tasks.

These findings can be interpreted in the context of theories concerning the writing process. Similar to reading, writing is an ongoing process which entails use of text structure strategy. As in reading, use of text structure strategy requires that writers have knowledge of the various structures. They then select the structure which is most appropriate for the writing purpose and for the intended audience. Students who are sensitive to text structure then use the structure as a guide for selecting and organizing the related details of text which are consistent with an overall plan. In this study, learning disabled adolescents and younger students appeared less able than normally achieving adolescents to use the structure provided in topic sentences as a strategy for planning and organizing their writing.

The failure of these students to use text structure strategy as efficiently as their normally achieving peers may be attributed to a number of factors. One explanation of the difficulty is that less

skilled writers are frequently less adept at the lower level writing skills of grammar, spelling, and punctuation and tend to get "bogged down" in the mechanics of writing instead of focusing on the higher level tasks of organization (Martlew, 1981). Consequently, the writing of these students often lacks organization and may consist of lists of loosely related ideas (Hall, 1981).

Another explanation is that these students may not have the knowledge of the various text structures or may be unable to apply their knowledge to tasks of differing demands. Although the results of the reading tasks suggest that all groups had similar knowledge of the text structures, it is possible that the learning disabled adolescents were unable to apply text structure knowledge to the more complex task of writing. Reading primarily requires that students be able to follow a given text structure. However, writing requires that students be able to introduce the topic in a way that leads the reader to anticipate the ideas that follow, and the information that follows must be structured so that it is compatible with the introduction. Although writers in this study did not have to introduce the topic, they had to be able to discern the topic and structure given in the topic sentence and then select and organize the information provided in the detail sentences. Thus, the writing task in this study challenged students to use text structure in a difficult task and thus better discriminated between subjects' ability to use text structure and showed the differential effects of text type on text structure use.

In this study, all groups were better able to write detail sentences that conformed to sequence text structure than to comparison-contrast text structure. This finding is consistent with the research on adult writers conducted by Hiebert et al. (1983). However, research on children's writing has failed to yield significant differences in the ability of third graders and sixth graders (Englert et al., 1985) and learning disabled students (Englert & Hiebert, in press) to write detail sentences conforming to sequence and comparison-contrast text structures. Possible explanations for the contradictory results concerning the differential effects of text structure may include the differences in tasks, differences in the ages and ability levels of subjects, or specific features pertaining to the writing stimuli, such as topic familiarity.

The finding that students were more sensitive to sequence text structure than to comparison-contrast text structure is consistent with findings concerning students' ability to identify text inconsistencies under cued conditions during reading; that is, students were better able to identify sentences inconsistent with sequence text than those inconsistent with comparison-contrast text. Further, students' apparent lack of awareness concerning the need to apply more complex fix-up strategies during reading in order to answer comprehension questions for comparison-contrast text provides corroborating evidence that all groups are less sensitive to the unique demands of comparison-contrast text structure. A discussion

concerning Meyer and Freedle's theory of the organizational components of these two text types which might account for the differences in difficulty was provided in Pattern 2.

Interpretation of Analysis for Hypothesis 3

The final hypothesis stated that there would be a weaker relationship between text structure use in reading and writing for students with learning disabilities and younger students than for their normally achieving peers. Contrary to the prediction, adolescents with learning disabilities and younger students did not demonstrate a lower level of correlation between reading and writing measures than normally achieving students. In fact, few significant correlations were found in the expected direction between reading and writing measures for any group. The pattern of low correlations between reading and writing measures for all groups did not permit a valid test of the hypothesis concerning the reading and writing correlations.

The lack of correlation between reading and writing measures found in this study are inconsistent with those obtained by Hiebert et al. (1983) who found a moderate correlation between college students' ability to discriminate related details from intrusive information in reading and their ability to write related detail sentences in a paragraph completion task. Similar to the findings reported by Hiebert et al., Englert and Thomas (in press) found a moderate correlation between students' ability to identify detail sentences which were inconsistent with the prevailing structure of

paragraphs and their ability to provide detail sentences in order to complete paragraphs. In addition, they found the relationship between reading and writing performance to increase in higher ability students.

The fact that reading and writing are interrelated is well established (Stotsky, 1983), and the few studies concerning text structure use in reading and writing concur that text structure use in reading and writing are moderately correlated. Thus, an area of concern in this research is to identify some possible explanations for the general failure of the reading and writing measures to be correlated. First, as discussed in the Results chapter, there was not a normal distribution pattern for the reading measures; thus, the predicted correlations could not be expected to materialize. Second, as mentioned previously, it is likely that the reading tasks failed to induce use of text strategy in many readers. Consequently, the correlations calculated between reading and writing measures do not represent the relationship between students' ability to use text structure in reading and writing. Third, it was mentioned in the Results chapter that the reading measures were selected in order to tap different aspects of the reading process which may differ in their rate of development. Thus, it could be hypothesized that similar patterns of correlations between the writing measure and the reading measures might only occur for mature readers.

The results and interpretation provided in this discussion must be considered in the context of the limitations of the study. The

limitations related to the dependent measures and the methodology are discussed in the next section of this chapter.

## Limitations of the Study

The limitations of the study will be considered according to the topics listed in the Methods chapter. These are subjects, setting, instrumentation, procedures, and research design and analysis.

### Subjects

An important limitation to the study was the method for subject selection. Although the original design of the study called for random selection of subjects, the limited population precluded the procedure for the group of adolescents with learning disabilities and the fourth graders. Consequently, the possibility that these two groups comprised biased representations of the populations is heightened (Mason & Bramble, 1978).

Another problem with subject selection concerns the low IQ scores of the adolescents with learning disabilities. Since individuals with learning disabilities are by definition typically considered to be within the average range of intelligence, it could be argued that the sample used in this study did not represent those with learning disabilities.

A related issue concerns the heterogeneity of persons who are identified as learning disabled. Research indicates that these individuals vary widely in their characteristic learning patterns and that they respond differentially to various teaching techniques (Lyon, 1985). The subject selection procedures used in this study

did not attempt to differentiate among various "subtypes" of learning disabilities; consequently, it could be argued that the reading characteristics of the learning disabled subjects used in this study may have varied widely and thus it may be inappropriate to apply these findings to specific sub-types within the population of learning disabled students. On the other hand, the heterogeneous nature of the sample may be representative of the heterogeneity found in the learning disabled population as a whole.

Setting

The administration of the reading and writing tasks in the applied school setting, as opposed to the controlled laboratory environment, also posed a limitation to the study. First, a common site was not available for administration of tasks to all subjects; that is, fourth graders were tested in a different location than adolescent students. Although attempts were made to secure similar sites, it is possible that the sites had differential effects on subject performance.

Second, although the administrators in each school provided the least distracting location possible, each site suffered some distraction from teacher interruption and outside noise. Although these distractions were relatively minor, they may have had impact on student behavior, particularly for the highly sensitive measure of reading time.

Instrumentation

There were several characteristics of the instruments used in the reading and writing activities which may have limited the generality of the research findings. These instruments, which include the reading paragraphs, comprehension questions, writing stimuli, computer program, and Familiarity Scale will be discussed separately.

Reading paragraphs. One limitation of the paragraphs was their simplicity. As mentioned in the Methods chapter, the paragraphs were limited to only five sentences in length and readability was at early second grade level. It has been well established that such factors as level of difficulty of the reading material influence reader comprehension and use of strategies. In fact, research shows that readers may fail to implement reading strategies when reading simple material because such strategies are not required for comprehension (Forrest-Pressley & Gillies, 1983). Thus, it could be argued in this study that failure to obtain differential use of text structure strategy for group or text type might be attributable to the simplicity of the text.

A related problem concerns the gap between readability levels of the paragraphs and student reading ability. Since the same paragraphs were used for all three experimental groups, it would appear that they would pose a greater challenge for fourth grade readers and adolescents with learning disabilities than for regular education students. Although this problem might have been solved by

the development of two sets of paragraphs (one for regular education adolescents and one for the remaining two groups), such a practice also has limitations because a two year gap between readability level and reading ability at fourth grade is not equivalent to a two year gap at seventh or eighth grade.

Comprehension questions. It became apparent during the field testing that the comprehension questions were a limitation to the study. As mentioned in the Methods chapter, the accuracy level for responses to questions never reached the level of chance; i.e., the questions were not text dependent. Consequently, student outcome on this measure may be a function of the questions rather than a measure of text structure strategy.

Another weakness of the comprehension questions concerns the ecological validity of requiring students to select the answer which is presented in the paragraph from three correct choices. Such a task becomes a task of discrimination, rather than one of reading comprehension. This tactic was included as a last resort in order to make questions as text dependent as possible. Although it was not the most desirable alternative, research by Raphael and Pearson (1985) and Raphael and Wonnacott (1985) indicates that the task is a legitimate one. They state that the ability to answer questions in the school setting is positively influenced by knowing whether to call on information presented in the text or on their background knowledge to answer specific questions.

Use of a different measure of reading comprehension, such as retelling, would have had some advantages over the use of questions. Various researchers point out that retelling is advantageous because it provides information concerning gaps in knowledge about the topic, use of inference to modify inconsistent information in text, and the use of the structure of text in recalling the material (Garner & Reis, 1981; Meyer et al., 1980). However, the number of topics in this study made retellings impractical.

Writing stimuli. A factor which might limit the generality of findings is the nature of the writing task. It could be argued that students in the classroom are rarely asked to perform a task in which they write a few sentences in order to complete a paragraph in which a topic sentence is provided. Consequently, the applicability of findings to student writing performance is limited. However, Englert and Hiebert (1984) argue that such a task may be an appropriate point of departure for assessment or beginning instruction in use of text structure in writing. Obviously, such a task is only one aspect to be incorporated in any assessment or training program.

Topic Familiarity Scale. The technique used to assess students' familiarity with the topics may be a limitation to the study. Research indicates that self-report of topic knowledge is not necessarily accurate (Hare, 1982) and that the use of other techniques, such as Guilford's (1954) method of paired comparisons, may be more appropriate for assessing relative familiarity with topics (Winograd & Newell,1985).

Procedures

The simplicity of the reading task was a limitation to the present study. Students were instructed to read the paragraphs for the purpose of answering the comprehension questions. As discussed previously, these questions were easily answered. Consequently, students may not have invoked their use of text structure strategy because they could perform quite well without it. In fact, since none of the questions related to the inconsistent information, students could ignore the inconsistent sentence and answer all the questions correctly.

A procedure which might have had differential effects on student reading performance concerned the length of the task. The administration of 15 paragraphs in two tasks may have been too long. The combination of reading the paragraphs, answering questions, and identifying inconsistent sentences accompanied by the pauses between paragraphs which were necessary in order for the computer program to operate may have caused a fatigue factor. However, presentation of the paragraphs was randomized in order to control for fatigue effects.

An additional limiting factor in the study was the procedure used during reading for advancing to the next sentence or selecting a lookback. Since reading time is such a sensitive measure, many researchers have attempted to control for time used in searching behavior or responding versus actual reading time through use of such techniques as placing a "button" in the hand of the subject

accompanied by the instruction that they are to press the button immediately when they are ready to proceed. Consequently, minimal time is spent in such activity as looking for the appropriate key. Unfortunately, some subjects in this study were observed to engage in such search behavior. In addition, students were not uniform in their approach to the task; that is, some students placed their fingers on the keys so that they could press them immediately, whereas other students placed their hands at their sides between key presses. Obviously, the response time for students with their fingers placed on the keys was less than that for students who had to reach up in order to press the key. Although this problem might be partially solved by more precise instruction in positioning, it would be preferable to alter the task so that students had a "Lookback" button in one hand and a "Move On" button in the other hand.

There were two obvious procedural limitations of the writing task related to the instructions. First, students were not provided a purpose for writing. Since writers compose according to the purposes or demands of the task, it would have been advisable to provide students with a rationale for the task. Although the experimenter still would not be sure that students were writing for the stated purpose, it would be preferable to having every student devise his or her own purpose for writing.

Second, although student writing performance was judged partially on the basis of the density of information included in the two sentences, students were not specifically advised to include as

much information as possible in their writing. Consequently, students were evaluated on a factor which was not made known to them.

Design and Analysis

One limitation of the analysis involved inclusion of the fifth sentence in the analysis of reading time and lookbacks. Since only fourth sentences were controlled for factors which are known to influence reading rate, such as sentence length and complexity, results which included data for fifth sentences must be interpreted with caution.

As mentioned previously, the complex tasks of reading and writing have led to much controversy concerning the appropriate methods for assessing these skills. One task which has been particularly controversial is the use of the error detection as a measure of strategy use during reading. In a critique of the error detection paradigm, Winograd and Johnston (1982) pointed out that readers' responses to errors are influenced by the kind of error inserted in the text, magnitude of the error, and its placement in the text. Garner and Anderson (1982) added that characteristics of the materials are critical factors in reader performance. Winograd and Johnston also stated that the use of question probes after reading was not an adequate measure of readers' recognition of the inconsistency; i.e., readers might notice the error, but fail to identify it during the probe. However, many reading experts acknowledge error detection as a useful tool for examining reading

strategies (Garner & Anderson; Raphael & Tierney, 1981; Winograd & Johnston).

One factor which must be considered in the interpretation of results is the use of the repeated measure design. In a critique of the use of repeated measures with a small number of subjects, Kamil (1984) discusses the advantages and limitations of this practice. He states that the use of repeated measures can be beneficial because it allows subjects to serve as their own control which reduces the amount of variance. Consequently, the power of the statistical tests is increased. However, the use of repeated measures also has limitations. Kamil noted that the repeated administration of the experimental task may lead to confounding of the data due to fatigue and practice effects. Perhaps most importantly, the risk of sampling error (that is, subjects who do not represent the target population) becomes a greater risk when repeated measures are used paired with a small number of subjects.

Caveat

Although there are several limitations to this study which have been described at some length, there were also several strengths of the study which should be considered.

First, the present study was specifically designed to overcome some of the recognized weaknesses of the error detection paradigm. For example, errors were carefully controlled so that they all represented inconsistencies to text structure, the magnitude of the errors was similar across paragraphs as indicated by adult readers'

ability to identify all of them, and all errors were placed in the same position within the paragraphs. Second, the use of probes was minimized and multiple measures of text structure awareness were included which did not rely on self-report. Third, the reading materials were carefully designed and controlled for factors which are known to influence reading comprehension, such as paragraph length, format, familiarity, and level of reading difficulty (e.g., Armbruster, 1984). Fourth, sentences were placed in contexts in which they were both consistent and inconsistent so that reader response to the sentences could be compared across conditions. This practice of comparing reading times for target sentences in different contexts is consistent with research using subject-paced reading (e.g., Cirilo & Foss, 1980; Haviland & Clark, 1974). Finally, the development of the error detection materials and procedures were carefully described in the Methods section so that other researchers might be able to replicate and interpret the findings in the context of these factors.

Second, the study was designed to obtain multiple measures of text structure strategy use. As recommended by Garner et al. (1983), use of multiple measures for complex tasks allows the researcher to observe patterns of performance which cannot be ascertained when a single dependent measure is utilized. In addition, the combination of product and process measures allowed observation of the complex interaction between these factors during reading.

Third, the instrumentation used in this study was carefully designed and field tested in an attempt to control for effects due to variables other than text structure. Readability levels and topic familiarity were considered in developing the reading and writing topics. Tasks and materials were presented to adult readers and writers to ensure that they were appropriate for the study. In addition, presentation of the stimulus paragraphs was counterbalanced across subjects to ensure that there would be no fatigue effects.

Thus, although there were a number of limitations to the study, there were also a number of strengths. Researchers doing additional studies on this topic should attempt to retain the strengths and take the limitations into consideration when designing future related studies.

## Implications for Instruction and Research

This section of the discussion concerns the implications of the findings for special education instruction and further research.

### Implications for Special Education Instruction

The methods used in this research and the research results have several implications for special education instruction. First, although the present study did not find that learning disabled students were poorer than their peers in their use of text structure in reading, the data indicated that none of the groups performed well in identifying text structure inconsistencies or in efficiently using corrective strategies in the presence of these inconsistencies. These findings and those of other research which strongly indicates

that learning disabled students have difficulty with text structure use when different texts and tasks are used (Englert & Thomas, in press) suggest that adolescents with learning disabilities also might benefit from instruction in text structure use in reading. In fact, Stanovich (1982) noted that a number of reading educators strongly advocate instruction in use of text structure strategies as a technique for extracting and organizing critical information in text during reading.

Second, the poor performance of learning disabled adolescents on the writing task suggests the need for instruction on the use of text structure in writing for these students. Their poor performance may be, at least in part, a reflection of the lack of writing instruction provided in the classroom. Research indicates that students are provided few opportunities for sustained writing (Applebee, 1984; Bridge, Hiebert, & Chesky, 1983) and that writing instruction typically entails practice in the lower-level writing skills of writing mechanics (Barenbaum, 1983). To teach students how to use text structure organization, writing instruction which emphasizes the use of text structure strategy at all stages of writing is needed. For example, Raphael, Englert, & Kirschner (1986) found that a training program which focused on use of four expository text structures during the process of writing (i.e., during planning, translating, and revising) improved students' writing performance.

The methodology and findings of this study have implications for both the content and sequence of text structure instruction. The

superior sensitivity of students to sequence text structure compared to comparison-contrast text suggests that teachers might begin instruction with less complex text types, such as sequence text. As students become more skilled at using simple text types, teachers could introduce more complex text types. Teachers should also take into consideration the differential development of text structure knowledge in selecting reading and writing assignments. However, it is not necessary for teachers to isolate students from material which contains complex organizational structures. In fact, Pace (1982) suggests that students need repeated encounters with different kinds of text structures in order to increase their sensitivity to text structure. It should also be stressed that instruction in text structure should not be isolated from the reading and writing curriculum; rather, it should be integrated into the total program so that students use text structure strategy as part of their reading and writing and do not view it as an isolated skill.

Another feature of this research which might be applicable to instruction was the use of microcomputers. The use of microcomputers in special education classrooms has increased dramatically in the past decade. Although some efforts have been directed toward the development of software and techniques for teaching reading and writing on the computer (Morocco & Neuman, 1986; Rosegrant, 1985), most software available to date is of a drill and practice nature (Henney, 1982). The program used in this study represents a procedure which might be adapted in order to evaluate text structure

use and teach students how to use the various expository text structures.

While the emphasis in this discussion has been on teaching use of text structure strategy, it should be emphasized that strategy training should not be conducted in isolation. Although a variety of experimental procedures have been developed for teaching text structure strategy use for both narrative (Fitzgerald & Spiegel, 1984; Whaley, 1981) and expository (Englert & Lichter, 1982; Raphael et al., 1986) text, effective instruction requires concurrent emphasis on both content and strategies (Wong, 1985).

The tasks used in this study have implications for assessment, as well as for instruction. According to Anderson et al. (1985), standardized tests do not provide sufficient information concerning reading and writing skills. Sampling target behaviors using a variety of texts and tasks as was done in the present study can provide useful information concerning how students use text structure strategy across conditions.

Finally, the findings of the study have important implications for the way educators view learning disabled students. The variable performance of students according to the text and task affirms that use of metacognitive strategies is not static. Whereas the literature suggests that learning disabled students fail to use strategies to promote learning, the findings here suggest that the gap lessens when simple material is used. However, when more challenging material, such as the writing task, is introduced,

patterns of strategy use begin to emerge. In response to this view of learning disabled students, teachers may need to expand or revise their view of assessment and instructional practices. Specifically with regard to text structure strategy, assessment should include a description of the effects of text and task variations on text structure use, and instruction should involve expanding and refining students' current knowledge of text structure so that they can independently use text structure strategy in order to accomplish the stated goal.

Implications for Special Education Research

Although comparisons between the skills of learning disabled and normally achieving students are useful, results of this study and others which have investigated strategy use under varying conditions emphasize the need for research which goes beyond describing the differences between groups of students of different reading and writing abilities. Research is needed which systematically investigates strategy use across a variety of texts and tasks (Garner & Anderson, 1982). The contradictory results of this and other research concerning knowledge and use of text structure strategy underscores the need for such investigations.

Future research concerning use of text structure as a metacognitive strategy should address several issues. First, the effects of the various types of expository text structures on performance of learning disabled students should be examined. This study only considered two of Meyer's (1975) text structure

classifications. Studies concerning the relative influence of the remaining structures on strategy use should also be conducted.

A second area of investigation should involve the development of text structure strategy for each text type. According to theories concerning metacognitive development, the ability to consciously select and apply strategies effectively is gradually acquired. Thus, it is of interest to know how these text structures develop. A related area of research which should be pursued is to identify the changing relationship between text structure use in reading and writing for text strategy in general and for individual text structures.

Future research concerning text structure use should be conducted using tasks which approximate actual classroom activities. One limitation to this study was that the materials and tasks used did not represent what typically is found in classrooms. Since strategy use is influenced by the demands of the task, it is difficult to apply the findings of this study to the classroom. Examples of tasks which might be investigated in future studies include reading and studying content area material and writing reports requiring various types of text structures.

Some researchers have dealt with the problems related to the development of controlled texts and tasks by using multiple regression procedures instead of the ANOVA tests. Multiple regression allows for the partialling out of effects due to a variety of selected factors through the use of statistical tests.

Consequently, more natural text can be used. In addition, the use of regression weights allows for the qualitative analysis of effects; i.e., a measure of the relative influence of the independent variables on the dependent variables (Carpenter, 1984).

Another area for future research concerns methods of instruction in use of text structure strategy. The impact of a variety of techniques and materials needs to be investigated in order to develop the most effective methods for instruction. A particularly timely area of research is the use of microcomputers in text structure strategy assessment and instruction. Application of strategy training approaches, such as those developed by Deshler and his colleagues (Alley and Deshler, 1979; Deshler, Schumaker, & Lenz, 1984; Deshler, Schumaker, Lenz, & Ellis, 1984), to the teaching of text structure strategy also should be investigated. Success of intervention measures would be indicated by the independent, appropriate application of text structure strategies which would result in improved performance on the reading or writing task.

In an attempt to place research concerning use of text structure strategies in the appropriate context, it is important to note that Torgesen (1977) and others (Wong, 1979, 1985) recognize that ineffective use of learning strategies provides a partial, but insufficient, explanation of the learning difficulties of those with learning disabilities. According to Wong (1985), the importance of Torgesen's theory is to emphasize the importance of examining the learning strategies of those with learning disabilities as an

integral part of any assessment and remediation program. Wong (1985) adds that a combination of training in both cognitive and metacognitive skills comprises the appropriate intervention for students with learning disabilities. Thus, use of metacognitive strategies, such as text structure organization, by individuals with learning disabilities is an important issue, but ultimately the research findings in this area must be integrated with those of other areas in order to develop the most appropriate instruction for students with learning disabilities.

# APPENDICES

# APPENDIX A

## Informed Consent

### Use of Text Structure by Adolescents with Learning Disabilities

_____ may/ may not be eligible for participation in the
(circle one)
study being conducted by Sharon R. Stewart, a University of Kentucky doctoral student. This project is being carried out in my child's school from January 27 to March 30, 1986. During this time, my child will participate in two small group sessions for a total of about 90 minutes.

The purpose of this study is to find out how children use their knowledge of paragraph structure to help them read and write. This information may be helpful in finding better ways to teach children reading and writing skills. In this study, the performance of seventh and eighth grade students who are in classes for learning disabilities will be compared to students of the same age who are enrolled in regular classrooms and to fourth grade students in regular classrooms who read at grade level.

The study will be carried out as follows:

1. In the first session, students will read paragraphs and answer questions about them. Then students will answer questions about any errors they might have noticed in the paragraphs. The paragraphs will be presented on the computer. It is expected that this session will take about one hour.

2. The second session will be held about one week after the first session. During this 30 minute period, students will write sentences which best complete some partially written paragraphs.

3. Student's reading times, the number of times they review parts of paragraphs they have already read, answers to comprehension questions, and answers to questions about errors in the paragraphs will be examined. The sentences used to complete the partially written paragraphs will also be evaluated.

It is my understanding that participation in these two sessions will involve no known risk to my child. I understand that I may withdraw my permission at any time and that my child may refuse to take part in the study. Neither action will result in any prejudice toward my child.

My child's name and performance will be strictly confidential (known only to Ms. Stewart). No names of participating students will appear in any reports of the study.

(over)

Ms. Stewart will answer any questions I have about this research. She may be reached at 257-8594 during daytime hours and at 269-8329 during evening hours.

A copy of this form will be sent to me upon receipt of this signed original.

_____ _____

Date Parent or Guardian's Signature

I have explained and defined in detail the research procedures in which the student's legally authorized representative has been asked to participate.

_____ _____

Date Investigator's Signature

# APPENDIX B

## Topic Familiarity Survey
## Sequence Paragraphs

Listed below are 18 sequence paragraph topics and a scale for judging topic familiarity. The number 1 indicates that the topic is highly unfamiliar to students, whereas the number 5 indicates that the topic is highly familiar to students. For each topic, circle a number from 1 to 5 which represents how familiar you think fourth grade students are with the topic.

| Topic | Familiarity | | | | |
|---|---|---|---|---|---|
| | Highly Unfamiliar | | | | Highly Familiar |
| 1. Preparation for Painting | 1 | 2 | 3 | 4 | 5 |
| 2. Growing Crops | 1 | 2 | 3 | 4 | 5 |
| 3. Cutting Hair | 1 | 2 | 3 | 4 | 5 |
| 4. Getting Food at a Restaurant | 1 | 2 | 3 | 4 | 5 |
| 5. Rescuing a Drowning Person | 1 | 2 | 3 | 4 | 5 |
| 6. Riding a Bus | 1 | 2 | 3 | 4 | 5 |
| 7. Putting Out Fires | 1 | 2 | 3 | 4 | 5 |
| 8. Treating Cuts | 1 | 2 | 3 | 4 | 5 |
| 9. Buying Food at the Grocery | 1 | 2 | 3 | 4 | 5 |
| 10. Growth of a Butterfly | 1 | 2 | 3 | 4 | 5 |
| 11. Washing Clothes | 1 | 2 | 3 | 4 | 5 |
| 12. Making a Sandwich | 1 | 2 | 3 | 4 | 5 |
| 13. A Baby's Development | 1 | 2 | 3 | 4 | 5 |
| 14. Volcano Development | 1 | 2 | 3 | 4 | 5 |
| 15. Making a Snowman | 1 | 2 | 3 | 4 | 5 |
| 16. Making a Cake | 1 | 2 | 3 | 4 | 5 |
| 17. The Formation of Hail | 1 | 2 | 3 | 4 | 5 |
| 18. Making maple syrup | 1 | 2 | 3 | 4 | 5 |

Topic Familiarity Survey
Comparison-Contrast Paragraphs

Listed below are 18 comparison-contrast topics and a scale for judging topic familiarity. The number 1 indicates that the topic is highly unfamiliar to students, whereas the number 5 indicates that the topic is highly familiar to students. For each topic, circle a number from 1 to 5 which best represents how familiar you think fourth grade students in your class are with the topic.

| Topic | Familiarity | | | | |
|---|---|---|---|---|---|
| | Highly Unfamiliar | | | | Highly Familiar |
| 1. Deserts and Forests | 1 | 2 | 3 | 4 | 5 |
| 2. Cowboys of Today and Yesterday | 1 | 2 | 3 | 4 | 5 |
| 3. Trolleys and Buses | 1 | 2 | 3 | 4 | 5 |
| 4. Frogs and Toads | 1 | 2 | 3 | 4 | 5 |
| 5. Wolves and Dogs | 1 | 2 | 3 | 4 | 5 |
| 6. Lions and Cats | 1 | 2 | 3 | 4 | 5 |
| 7. Tornados and Hurricanes | 1 | 2 | 3 | 4 | 5 |
| 8. Ships and Planes | 1 | 2 | 3 | 4 | 5 |
| 9. Mittens and Gloves | 1 | 2 | 3 | 4 | 5 |
| 10. Firemen and Police Officers | 1 | 2 | 3 | 4 | 5 |
| 11. Movement of Birds and Snakes | 1 | 2 | 3 | 4 | 5 |
| 12. Moon and Sun | 1 | 2 | 3 | 4 | 5 |
| 13. Moths and Butterflies | 1 | 2 | 3 | 4 | 5 |
| 14. Plants and Animals | 1 | 2 | 3 | 4 | 5 |
| 15. Winter and Summer | 1 | 2 | 3 | 4 | 5 |
| 16. Whales and Humans | 1 | 2 | 3 | 4 | 5 |
| 17. Ground Squirrels and Tree Squirrels | 1 | 2 | 3 | 4 | 5 |
| 18. Cockroaches and Mosquitos | 1 | 2 | 3 | 4 | 5 |

# APPENDIX C

## Text Structure Evaluation

Explanation: Expository text can be organized according to various types of structures, such as description, enumeration, sequence, and comparison-contrast. Two of these structures - sequence and comparison-contrast - are the focus of my dissertation research. The following includes a definition and example of each of these text structures.

Sequence: the serial presentation of a number of steps or ideas in a continuous progression as they pertain to a process or event.

Example: Balls of ice falling from the sky are called hail. First, hot air close to the surface of the earth rises off the ground with water and goes up into the atmosphere. When it reaches the cold air above, the water carried by this hot air freezes and begins to fall. Last, winds force these balls of ice back up to receive another coating of ice until they are heavy enough to fall to the earth.

Comparison-contrast: specifies the likenesses and/or differences between two or more items.

Example: It is interesting how a candle moth and monarch butterfly are different. The moth's body is broad but the butterfly's body is narrow. When the moth is motionless its four wings are open. When the butterfly is motionless its wings are shut.

Instructions: Attached are 12 paragraphs which potentially will be used in the dissertation study. Each paragraph is intended to represent either the sequence or comparison-contrast type of text structure. Please read each paragraph and then circle the type of text structure you think the paragraph represents at the bottom of the page. Feel free to refer to the definitions and examples provided on this page.

Thank you so much for your assistance in this project!!

# APPENDIX D

## Sentence Inconsistency Evaluation

Explanation: One of the tasks in my dissertation study requires students to read paragraphs and then to identify for each paragraph any sentence which does not fit in or is inconsistent with the rest of the paragraph. Not all the paragraphs contain an inconsistent sentence. Sample paragraphs and evaluations follow:

Inconsistent Paragraph: Old Rivers and New Rivers

Old rivers and new rivers are different in some ways. While old rivers move slowly, new rivers move quickly. The Colorado River is a new river. Old rivers are wide, but new rivers are not. While it takes old rivers a long time to change the land, new rivers change the land quickly.

Evaluation: The third sentence in this paragraph is inconsistent with the remainder of the paragraph. Whereas the remaining sentences in the paragraph concern the differences between old and new rivers, sentence three does not - it simply provides the name of a new river.

Consistent Paragraph: How Babies Grow

It takes a long time for babies to learn to do things that grownups can do. When babies are first born, they cannot move very far. At about three months, they begin to roll over from front to back. When they are about five months old, babies learn to sit up. Babies begin to walk when they are about a year old.

Evaluation: Every sentence in this paragraph is consistent with the remainder of the paragraph. In this example, each sentence concerns the sequence of babies' development; i.e., how babies learn to do what grownups can do.

Instructions: Attached are 12 paragraphs which potentially will be used in my dissertation study. In some of the paragraphs, all the sentences fit. In other paragraphs, there is one sentence that does not fit with the rest of the paragraph. Please read each paragraph and circle the number of any sentence which appears inconsistent or does not fit with the paragraph. There will never be more than one inconsistent sentence per paragraph.

# APPENDIX E

## Reading Paragraphs

### SET 1

#### Comparison-Contrast*[a]: Lions and Cats

A lion is like a house cat in some ways. Cats and lions both like to sleep in the day and hunt at night. Like cats, lions wash themselves with their tongues. Lions then wash their hair until it is clean[b]. Young lions and young cats are alike because they both like to play.

#### Sequence: Treating a Cut

There are several things you should do when you get a cut. First, you should stop the bleeding. When the bleeding stops, you should put soap and water on the cut. You then wash the cut until it is clean. Finally, put medicine on the cut and wrap it so it stays clean.

[a]* = paragraph with inconsistency
[b]__ = fourth sentence

### SET 2

#### Comparison-Contrast*: Wolves and Dogs

Some dogs look much like wolves, but they are not the same. Most dogs live with people, but wolves are afraid of people. While wolves hunt their food, dogs don't. The owner then gives the food to the dogs. Dogs often live in doghouses, but wolves live in dens.

#### Sequence: Eating at a Restaurant

There are several things that happen when you eat at a restaurant. First you sit down and the waiter gives you a menu. After you look at the menu, you tell the waiter what you want. The waiter then gives your order to the cook. When your food is ready, the waiter brings it to you.

SET 3

Comparison-Contrast*: Winter and Summer

Winter and summer are very different times of year. The days in winter are much shorter than the days in summer. We can see many green plants in summer, but not in winter. The plants then grow all summer. Winter days are often cloudy and cold, but summer days are sunny and hot.

Sequence: Growing Corn

It takes a long time to grow corn. The corn seeds are planted in the Spring. In a few days, little corn plants begin to come up. The corn then grows all summer. In fall, the ripe corn is picked and sold.

SET 4

Comparison-Contrast: Frogs and Toads

Frogs and toads are different in several ways. Frogs can jump higher and farther than toads. While frogs are long and thin, toads are short and fat. Frog skins are wet, but toad skins are dry. Unlike frogs, the skin of toads is rough.

Sequence*: Painting Wood

To paint wood, several steps must be followed. First, the wood should be cleaned very carefully. Next, all the holes should be filled with putty. New putty is soft, but old putty is hard. After the wood is sanded with sandpaper, it is ready to be painted.

SET 5

Comparison-Contrast: Whales and People

Whales and people are alike in some ways. Both whales and people feed milk to their babies. Whales like to live in groups, just like people do. Whales and people both have to breathe air to live. Like people, whales make special sounds to talk to each other.

Sequence*: Growth of a Butterfly

A butterfly grows in several steps. First, a caterpillar comes out of a tiny egg. The caterpillar grows all summer and makes a cocoon in the fall. Butterflies and caterpillars both have to breathe air to live. The next spring, the cocoon opens and a butterfly comes out.

SET 6

Comparison-Contrast: Ships and Planes

Ships and planes are both used to move things, but they are different. Ships are much larger than planes. Unlike planes, ships can only go in the water. Ships go much slower than planes. But ships can carry more people and cargo than planes.

Sequence: Riding a Bus

There are several things you must do to ride a town bus. When you get on the bus, you put your money in the box. After you put money in the box, find an empty seat and sit down. Buses go much slower than planes. When you get close to where you want to get off, ring the bell.

# APPENDIX F

## Distractor Paragraphs

### Paragraph 1: Indian Girls

Indian girls learned many things. They learned to sew all their clothes. It is fun to dress like an Indian. Indian girls learned to make baskets. Another thing they learned was how to plant seeds.

### Paragraph 2: Camels

Camels live well in the desert for several reasons. I want to learn how to ride a camel. Camels can go days without food and water. Their feet are wide so they don't go down into the deep sand. Camels can close their noses to keep out sand.

### Paragraph 3: Fruit

Fruit can grow on many different kinds of plants. Apples and oranges grow on trees. Many berries grow on bushes. Grapes grow on vines. Apples can be red or yellow.

# APPENDIX G

## Instructions for Evaluation of Questions

Explanation: One of the tasks of my dissertation study requires students to read paragraphs and answer comprehension questions about what they have read. To ensure that the questions actually measure students' reading comprehension, it is important that the questions and answers be written so that they can only be answered correctly if students have understood what they have read. If questions can be answered correctly without requiring that students read and understand the paragraphs, then background knowledge of the topic, not reading comprehension, is being measured.

Instructions: The purpose of this task is to identify any comprehension questions which can be correctly answered consistently without reading the paragraph to which it pertains. Attached are 24 questions which will potentially be asked of students after they have read the experimental paragraphs. Please read the questions in order and circle one answer to each question. If you are unable to determine the correct answer, circle your best guess. If you change your answer, please indicate the change by making an X through your original answer and circling your new answer.

Thank you for your help in this project!!

APPENDIX H

Final Comprehension Questions and Percent Correct Responses

| Question | Percent Correct |
|---|---|
| GROWTH OF A BUTTERFLY | |
| 1. When does the cocoon open and a butterfly come out?<br>1. the next April or May<br>2. the next Spring<br>3. when the weather turns warm | 80% |
| 2. What does the caterpillar do all summer?<br>1. grows<br>2. eats leaves<br>3. crawls around | 20 |
| RIDING A BUS | |
| 3. When you get on a bus, where do you put your money?<br>1. in the box<br>2. in the machine<br>3. in the driver's hand | 60 |
| 4. What do you do when you get close to where you want to get off?<br>1. stand up<br>2. tell the bus driver<br>3. ring the bell | 60 |
| GROWING CORN | |
| 5. When do little corn plants begin to come up?<br>1. in a few days<br>2. in about a week<br>3. in 5 days | 20 |
| 6. In Fall, what is picked and sold?<br>1. sweet corn<br>2. field corn<br>3. ripe corn | 40 |

TREATING A CUT

7. How long do you keep washing a cut? 80
   1. until it stops hurting
   2. until it is clean
   3. until it stops bleeding

8. When the bleeding stops, what should you put on a cut? 20
   1. a bandaid
   2. first aid cream
   3. soap and water

EATING AT A RESTAURANT

9. When do you tell the waiter what you want? 20
   1. after the waiter asks you
   2. after the waiter comes back to your table
   3. after you look at the menu

10. When does a waiter bring your food to you? 100
   1. when it is ready
   2. when it is still hot
   3. when you ask him to

FROGS AND TOADS

11. Unlike frogs, what is the skin of toads like? 0
   1. brown
   2. rough
   3. cold

12. How can frogs jump? 60
   1. higher and farther than toads
   2. lower and shorter than toads
   3. better and more often than toads

LIONS AND CATS

13. What do lions and cats both like to do at night? 60
   1. sleep
   2. eat
   3. hunt

14. How are young lions and young house cats alike? 60
   1. both eat a lot and grow fast
   2. both like to play
   3. both are smaller than their parents

SHIPS AND PLANES

15. Unlike planes, where can ships go? 80
    1. only in the water
    2. only to cities with ports
    3. only to countries which are on the water

16. How are ships? 40
    1. more fun to ride on than planes
    2. much larger than planes
    3. much rougher to ride on than planes

WHALES AND PEOPLE

17. What do whales and people both have to do to live? 80
    1. rest sometimes
    2. eat and drink
    3. breathe air

18. How do whales like to live? 20
    1. alone most of the time
    2. in groups
    3. with one other whale

WINTER AND SUMMER

19. What can we see in summer, but not in winter? 20
    1. mother robins
    2. pretty flowers
    3. many green plants

20. How are winter days? 40
    1. often cloudy and cold
    2. often cold and snowy
    3. often icy and cold

WOLVES AND DOGS

21. What do dogs often live in? 40
    1. their owner's house
    2. doghouses
    3. kennels

22. What do most dogs live with? 40
    1. their master
    2. children
    3. people

PAINTING WOOD

23. What should be filled with putty? 80
    1. all the scratches
    2. all the cracks
    3. all the holes

24. How should the wood be cleaned? 60
    1. very carefully
    2. with a scraper
    3. with paint cleaner

# APPENDIX I

## Instructions for Paragraph Writing

Name: _____

Directions: Listed below are the first sentences of six paragraphs. Assume they are paragraphs you are constructing, but you can only write two additional sentences to make your point. Write two sentences that would follow and yet would fit closely with the introductory sentences. Your aim is to convey information to the reader as precisely as possible.

Again, remember to write two sentences that fit closely with the ideas and stucture of the paragraphs already begun.

# APPENDIX J

## Writing Stimuli

NOTE: Each stimulus appeared on a separate page on the students' copy.

### FORESTS AND DESERTS

Forests and deserts are different in many ways. ____

_____

_____

_____

_____

_____

### MOON AND SUN

While the moon and sun may look alike to us, they are not the same. _____

_____

_____

_____

_____

PLANTS AND ANIMALS

Plants and animals are alike in many ways._____

_____

_____

_____

_____

_____

_____

BUYING FOOD

This is the way you buy food at the grocery store.

_____

_____

_____

_____

_____

_____

## MAKING A SANDWICH

You can make a peanut butter sandwich if you follow these steps.

## WASHING CLOTHES

These are the steps you follow when you wash clothes.

# APPENDIX K

## Scoring Scale for Writing Task

| Score | Description | Example |
|---|---|---|
| 2 | Sentence includes relevant details that meet both topic and text structure requirements. Each sentence conveys new information. For comparison-contrast text, both items in the topic sentence are described according to parallel attributes and appropriate signal words (e.g., but, however) or comparative forms (e.g., bigger than) are used. For sequence text, the process or sequence of steps is clearly evident and an appropriate signal word is present in at least one sentence. | The sun is much larger than the moon. (2)<br>The sun is very hot but the moon is not. (2)<br><br>Go down the aisles and get the food you want. (2)<br>Then take it to the cashier and check out. (2) |
| 1 | Sentence meets some, but not all, the topic and text structure requirements. For example, for comparison-contrast text, items are only partially described according to parallel attributes or no signal words are used. For sequence text, large steps are omitted or no signal words are used. | Forests are sometimes cool and wet, but deserts are dry all the time. (1)<br>A forest has animals and a desert does not. (1)<br><br>Get the wash powder out (2).<br>Pour it in and turn it on. (1) |
| 0 | Sentence fails to fit topic and text structure, is incomprehensible, includes irrelevant information or first-hand personal experience unrelated to the topic, or fails to introduce new information. For comparison-contrast text, only one item is mentioned or no parallel attributes are identified. For sequence text, no process or sequence is indicated (i.e., no steps or only one step is indicated). | A forest has lots of trees, and deserts are dry. (0).<br>Some deserts have animals and some are hot. (0)<br><br>Put peanut butter on both sides of the bread and it tastes better. (0) |

# APPENDIX L

## Reading Protocol

1. Introduction to Task. (Students sit at computer; names are entered on program.) My name is Sharon Stewart, and I am a student at the University of Kentucky. For the next few weeks, I will be asking some of the students in this school to do some reading and writing. Today you will be reading. The writing activity will take place about a week from now.
(Criteria: Quoted or paraphrased; must include underlined info.)

2. Word List and Familiarity Scale

A. Instructions. Before we begin rereading, I have two things for you to do. One of the things you will do is fill out this form. (Hand students the Familiarity Scale.) Read the directions to yourself as I read them to you. (Read instructions aloud). Any questions?

The other thing you will do is read the words aloud that are on this sheet of paper. (Show Word List) If there are any words you don't know, I will tell you what they are. Each of you will have a different list. Any questions?
(Criteria: Quoted or paraphrased)

B. Subjects alternate tasks. We will take turns doing these things. First, you will do this form (I give F Scale to one subject). While you are doing this, you will read these words for me. (I give W List to other subject.) You can start now.

After the subjects complete the first task, they alternate to perform the second task.
(Criteria: Quoted or paraphrased. Subjects alternately perform both tasks.)

C. Alternate Word Lists used.
(Criteria: One subjects reads List 1; the other reads List 2.)

D. Misread words on Lists are explained.
(Criteria: Words missed are corrected and explained in each instance.)

3. Part 1, Computer Reading Task.

A. Instructions. The reading you will do today will be done on the computer. The whole session will take you about an hour. You will take a short break in the middle - the computer will tell you when. First you will read the instructions. Read these instructions at your own pace. Please ask me about any words or any instructions you don't understand. At the end of the instructions, the computer will tell you to wait. It is very important that you wait when the computer tells you to. I will tell you what to do after that. Any questions? (Answer questions) Begin.
(Criteria: Quoted or paraphrased. Student questions answered.)

B. Instructions at End of Directions. You are now ready to begin the reading task. Do you have any questions about what you are to do? When you begin reading the paragraphs (stories), I will not be able to answer any questions. If there are any words you don't know, just do the best you can. It is important that you do not talk. When you have finished reading the stories and answering the questions, you will be able to take a short break. Are you ready? Begin.
(Criteria: Quoted or paraphrased.)

C. Subject Questions During Program. For any question concerning the vocabulary or content of the paragraphs, the subject is told, "I'm sorry. I cannot answer that questions. Just do the best you can."
(Criteria: Above response is provided appropriately in each instance.)

4. Break.
(Criteria: Subjects are allowed to take a short break (2-5 minutes) when signaled by the computer.)

5. Part 2, Computer Reading Task.

A. Instructions. Now we are ready to do the second part of the reading. This part will not take as long as the first part. First, you will read the instructions. Please ask me about any words or any instructions you do not understand. After you finish the instructions and begin reading the paragraphs, I will not be able to answer any questions about them. Ready? Begin.
(Criteria: Quoted or paraphrased.)

B. Subject Questions During Program. For any question concerning the paragraphs, the subject is told, "I'm sorry. I cannot answer that questions. Just do the best you can."
(Criteria: Above response is provided in each instance.)

6. Concluding Remarks. (Individually or together) You are finished with the reading activity. As I told you earlier, you will come back with some of your classmates in about a week to do a writing activity. If any students ask you about what you have done today, you can tell them that you read some stories and answered some questions about them. At the end of the writing activity next week, I will explain more to you about why I asked you to do these things. Do you have any questions about what you have done today? Any questions about next time? Thank you for your help. Return to...
(Criteria: Quoted or paraphrased.)

# APPENDIX M

## Word List 1

breathe
menu
skins
sandpaper
caterpillar
anywhere
sunny
ripe
ports
wrap
doghouses
waiter
unlike
scraper
cocoon
robins
rough
icy
cargo
driver
cleaner
leaves
aid
themselves
bleeding
wolves
restaurant
toads
putty
whales
butterfly
planes
cloudy
corn
snowy
cracks
owner
bandaid
tongues
medicine
alike
master
kennels

Word List 2

medicine
tongues
bandaid
owner
cracks
corn
planes
whales
toads
wolves
themselves
breathe
skins
caterpillar
sunny
ports
doghouses
unlike
driver
cleaner
leaves
master

icy
rough
robins
cocoon
snowy
cloudy
butterfly
putty
restaurant
bleeding
aid
menu
sandpaper
anywhere
ripe
wrap
waiter
scraper
kennels
alike
cargo

APPENDIX N

Student Familiarity Rating Scale

Directions: You are going to read the titles of 18 stories. Circle the number that tells how much you think you know about each one.

| | I don't know very much about this. | I know a little about this. | I know some about this. | I know a lot about this. | I know a whole lot about this. |
|---|---|---|---|---|---|
| Lions and Cats | 1 | 2 | 3 | 4 | 5 |
| Treating a Cut | 1 | 2 | 3 | 4 | 5 |
| Wolves and Dogs | 1 | 2 | 3 | 4 | 5 |
| Eating at a Restaurant | 1 | 2 | 3 | 4 | 5 |
| Frogs and Toads | 1 | 2 | 3 | 4 | 5 |
| Painting Wood | 1 | 2 | 3 | 4 | 5 |
| Whales and People | 1 | 2 | 3 | 4 | 5 |
| Growth of a Butterfly | 1 | 2 | 3 | 4 | 5 |
| Ships and Planes | 1 | 2 | 3 | 4 | 5 |
| Riding a Bus | 1 | 2 | 3 | 4 | 5 |
| Winter and Summer | 1 | 2 | 3 | 4 | 5 |
| Growing Crops | 1 | 2 | 3 | 4 | 5 |
| Buying Food at the Grocery | 1 | 2 | 3 | 4 | 5 |
| Plants and Animals | 1 | 2 | 3 | 4 | 5 |
| Making a Sandwich | 1 | 2 | 3 | 4 | 5 |
| Deserts and Forests | 1 | 2 | 3 | 4 | 5 |
| Washing Clothes | 1 | 2 | 3 | 4 | 5 |
| Moon and Sun | 1 | 2 | 3 | 4 | 5 |

# APPENDIX O

## Writing Protocol

1. Introduction to Task. (Students sit at desk area; booklets and pencils in front of them.) In case you don't remember, my name is Sharon Stewart, and I am from the University of Kentucky. Last time we worked together, you did some reading on the computer. This time we will do some writing. This activity will take about 20 or 30 minutes. (For those groups who also have to take the reading test, I will explain that after the writing activity, they will take a reading test.)

I have given each of you a booklet. The booklet has seven pages. Each page has a title and the first sentence of a (story) paragraph. Your job will be to write two sentences which best complete (or finish) each (story) paragraph. Look at page 1 and we will practice. (Students turn to page 1) Read to yourself as I read the title and the first sentence aloud. 'Animal Helpers. Animals help people in many ways' Now, write two sentences that you think best complete the (story) paragraph. You do not have to use all the lines. (Give students time to write. Get feedback. Point out that there is not just one right answer).

For each (story) paragraph, I will read the title and the first sentence aloud. You will write two sentences which best complete the (stories) paragraphs on the lines. When you finish writing a (story) paragraph, wait until I tell you to turn the page. Are there any questions? Turn to page 2.
(Criteria: Quoted or paraphrased.)

2-8. Paragraphs 1-6.

A. Title and stem read aloud.
(Criteria: Title and stem read exactly as printed on the page.)

B. 'Write two sentences that best complete (finish) the (story) paragraph.'
(Criteria: Quote.)

C. After all are finished, E. says, ' Turn to page .' (After P6, say, 'Close your booklets.') (Criteria: All students finished before going on; quote)

9. Debriefing. (Given at end of writing task or at end of reading test.) I would like to tell you why I asked you to do these reading and writing activities. I am doing a study to find out how students understand and write certain kinds of stories. Some of the stories tell the steps in how you do something (give example), and some of them compare things (give example). I wanted to find out which kind of story is harder for fourth graders and for seventh and eighth graders to understand and write. By finding out how well students understand and write these stories, we may be able to help teachers learn better ways to teach students.

As I told you a few days ago, the only person who knows how well you did on answering the questions on the computer and in writing the paragraphs is me. Your teacher will not know your score and it will not have anything to do with your grades. If you want to know how many questions you got correct on the stories you read on the computer, ask me when we are finished today. If you don't want to know, that is find, too.
(Criteria Quote/ paraphrase)

APPENDIX P

Procedural Reliability Form
Reading Protocol

Date: _____
Start time: _____ Stop time: _____
Observor: _____
Examiner: _____

CODE:
+ - correct
x - error
NA - not app.

---

1. Introduction to Task _____
   (Criteria: Quote/Close paraphrase)

2. Word list, Familiarity Scale
   A. Instructions
      (Criteria: Quote/Close paraphrase) _____
   B. Subjects alternate tasks
      (Criteria: Quote/Close par; S's alternate) _____
   C. Alternate word lists used
      (Criteria: 1 S uses L1; 1 S uses L2) _____
   D. Misread words on Lists explained
      (Criteria: Each wd. corrected & explained _____

3. Part I, Computer Reading Task
   A. Instructions
      (Criteria: Quote/ Close paraphrase. S. questions answered) _____
   B. Instructions at end of Directions
      (Criteria: Quote/ Close paraphrase) _____
   C. Subject Questions
      (Criteria: Correct response each instance) _____

4. Break (Criteria: Provided when signaled) _____

5. Part 2, Computer Reading Task
   A. Instructions
      (Criteria: Quote/ Close paraphrase. S. questions answered) _____
   B. Subject Questions
      (Criteria: Correct response each instance) _____

6. Concluding Remarks.
   (Criteria: Quote/Close paraphrase) _____

---

% Compliance _____ #+ _____ #x _____

Procedural Reliability Form
Writing Protocol

Date: _____
Start time: _____ Stop time: _____
Observor: _____
Examiner: _____

CODE:
+ - correct
x - error
NA - not app.

---

1. Introduction to Task
   (Criteria: Quote/ Close paraphrase) _____

2. Paragraph 1
   A. P1 title & stem read aloud _____
   B. "Write 2 sent. that best .... _____
   C. All are finished; "Turn to page 3." _____

4. Paragraph 2
   A. P2 title & stem read aloud _____
   B. "Write 2 sent. that best .... _____
   C. All are finished; "Turn to page 4." _____

5. Paragraph 3
   A. P3 title & stem read aloud _____
   B. "Write 2 sent. that best .... _____
   C. All are finished; "Turn to page 5." _____

6. Paragraph 4
   A. P4 title & stem read aloud _____
   B. "Write 2 sent. that best .... _____
   C. All are finished; "Turn to page 6." _____

7. Paragraph 5
   A. P5 title & stem read aloud _____
   B. "Write 2 sent. that best .... _____
   C. All are finished; "Turn to page 7." _____

8. Paragraph 6
   A. P6 title & stem read aloud _____
   B. "Write 2 sent. that best .... _____
   C. All are finished, "Close your book..." _____
   (Criteria: Steps 2-8 should be quotes)

9. Debriefing
   (Criteria: Quote/ Close paraphrase) _____

---

% Compliance _____ #+ #x

References

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# CURRICULUM VITA
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## PROFESSIONAL EXPERIENCE

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PUBLICATIONS

Englert, C.S., Hiebert, E.H., & Stewart, S.R. (1985). Spelling unfamilar words by analogy strategy. Journal of Special Education, 19, 291-306.

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Page, J.L., & Stewart, S.R. (1985). Story grammar skills in school-aged children. Topics in Language Disorders, 5 (2), 16-30.

MANUSCRIPTS SUBMITTED

Englert, C.S., Hiebert, E.H., & Stewart, S.R. Detecting and correcting inconsistencies in the monitoring of expository prose. Submitted to Contemporary Educational Psychology.

Englert, C.S., Stewart, S.R., & Hiebert, E.H. Young writers' use of text structure in expository text generation. Submitted to Journal of Educational Psychology.

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